# WATER RESOURCES STUDY

# Metropolitan Spokane Region



## APPENDIX I

## Institutional Analysis

JANUARY 1976





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WATER RESOURCES STUDY

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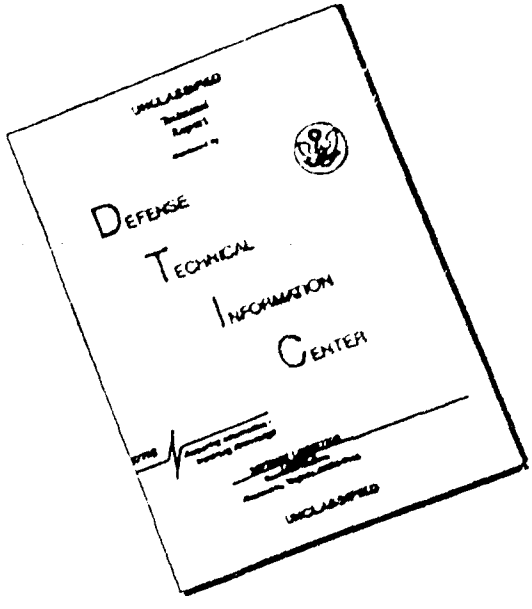


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# LIST OF REPORTS AND APPENDICES

## REPORTS

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# METROPOLITAN SPOKANE REGION WATER RESOURCES STUDY

# APPENDIX I.

# INSTITUTIONAL ANALYSIS

(12) 47 p.

(11) JANUARY 1976

Department of the Army
Corps of Engineers, Seattle District

Kennedy-Tudor Consulting Engineers

KT KENNEDY TUDOR

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# ACKNOWLEDGEMENTS

The Metropolitan Spokane Region Water Resources study was accomplished by the Seattle District, U.S. Army Corps of Engineers assisted by Kennedy-Tudor Consulting Engineers under sponsorship of the Spokane Regional Planning Conference. Technical guidance was provided by the Spokane River Basin Coordinating Committee, with general guidance from the study's citizens committee. Major cooperating agencies include Spokane City and County, and the Washington State Department of Ecology. The study was coordinated with appropriate Federal and State agencies and with the general public within the metropolitan Spokane area.

The summary report was prepared by the Seattle District Corps of Engineers. The technical report and appendices were prepared for the Seattle District, Corps of Engineers by Kennedy-Tudor Consulting Engineers.

# PREFACE

With the enactment of the Federal Water Pollution Control Act Amendment of 1972 (Public Law 92-500), new national goals have been established for the elimination of pollution discharges into our streams and lakes. This appendix is a part of the report prepared to assist local government in satisfying State and Federal Requirements relating to Public Law 92-500. The suggestions contained in this report are for implementation by local interests with available assistance from other local, State and Federal agencies. The study suggests a regional wastewater management plan for the metropolitan Spokane urban area and provides major input to Washington State Department of Ecology Section 303e plans for the Spokane River Basin in Washington State. Also included in the study are planning suggestions for urban runoff and flood control, and the protection of the area's water supply resources.

As listed on the inside front cover, documentation for this study consists of a Summary Report and a Technical Report with supporting Appendices A through J.

The Technical Report summarizes Appendices A through J, which contain 58 individual task section reports prepared during the study. These task sections are listed by title in Attachment I of the Technical Report. Generally, the numbering of appendix task sections reflects the following system:

| Study Task Sections | Type of Study Activity |
|---|---|
| 300's | Data Collection |
| 400's | Data Evaluation and Projection |
| 500's | Identification of Unmet Needs |
| 600's | Development of Alternative Plans |
| 700's | Evaluation Comparison and Selection of Plans |
| 800's | Institutional Arrangements |

Pages within each appendix are numbered by task section, as illustrated below:

701.2 - 45

Task section identifier

Identifies page number, numbered consecutively from beginning of task section

# APPENDIX I - INSTITUTIONAL ANALYSIS

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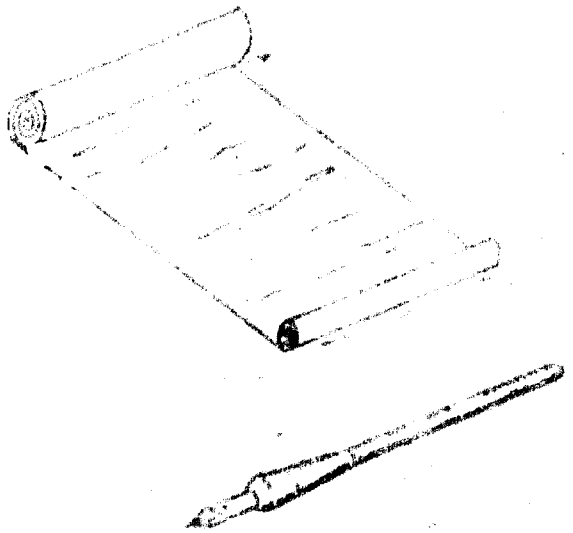
A detailed index for each task section precedes the respective section text.



# SECTION 801.2

## CONSTITUTIONAL AND STATUTORY AUTHORITY OF SEWERAGE AGENCIES IN THE STATE OF WASHINGTON

WATER RESOURCES STUDY

METROPOLITAN SPOKANE REGION

SECTION 801.2

# CONSTITUTIONAL AND STATUTORY AUTHORITY OF SEWERAGE AGENCIES IN THE STATE OF WASHINGTON

Prepared by Bartle Wells Associates in
cooperation with Kennedy-Tudor
Consulting Engineers



25 June 1975

Department of the Army, Seattle District
Corps of Engineers
Kennedy-Tudor Consulting Engineers

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TABLE INDEX

SECTION 801.2

# CONSTITUTIONAL AND STATUTORY AUTHORITY OF SEWERAGE AGENCIES IN THE STATE OF WASHINGTON

This chapter briefly describes the powers of various agencies authorized to provide sewerage service in the State of Washington. It also discusses constitutional and statutory restrictions upon these agencies.

The analysis of sewerage agencies is broken into three main sections. The first describes general limits on tax rates and agency debt. The second presents in tabular form information on agency formation, governing board, functional powers and financing powers. The tables are intended to provide summary references to show similarities and differences between sewerage agencies. The third section briefly describes the various agencies and shows selected excerpts from the relevant Washington statutes.

## CONSTITUTIONAL PROVISIONS CONCERNING SEWERAGE SERVICE AND SEWERAGE FINANCING IN GENERAL

Perhaps the most important Washington State constitutional sections affecting the provision of sewer service concern financing limitations for local agencies. These restrictions are of two kinds:

1. Limitations on operating tax rates for local agencies, and

2. limitations on debt financing by local agencies.

Operating Tax Rate Limitations - The maximum total aggregate operating tax rate for all taxing entities combined is set by Amendments 59 and 55 of the state constitution at $40 per thousand dollars of assessed valuation. These amendments were passed in 1973 by vote of the people of the state and amended the provisions of Article 7, Section 2 of the state constitution. Essentially, this limitation means that the combined tax rate of all local agencies on any given taxable real or personal property may not exceed $40 per thousand dollars of assessed valuation without an approving vote by the electorate. This section specifically excludes from this restriction taxes levied by public utility districts and port districts, neither of which is empowered to provide sewerage service.

Assessed valuation is defined by these same constitutional amendments as 50 percent of "true and fair value" of taxable property. The 40 mill restriction is therefore equivalent to a tax limitation of 2 percent of market value. This limit may be exceeded only by a 3/5ths vote of the residents of the taxing district, with a minimum voter turnout of 40 percent of those district residents who voted at the last general election. If less than 40 percent of the voters turn out, the tax increase is allowed only if the number of persons voting for the tax increase equals or exceeds 3/5ths of 40 percent of those district residents who voted at the last general election. The limitation of Article 7, Section 2 does not apply

to tax rates required to repay general indebtedness voted by a 3/5ths majority of district residents if the proceeds of the general indebtedness bonds are used solely for capital purposes.

Debt Limit For All Local Agencies - Constitution Article 8, Section 6, prescribes a debt limit for all local agencies in the State of Washington. The direct debt limit for all local agencies (for any and all debt forms) is, without a vote, set at 1-1/2 percent of the assessed value (3/4ths percent true and fair value) of taxable property within the jurisdiction. With a 3/5ths majority vote, debt of up to 5 percent of assessed valuation may be incurred. However, a special exception is made for cities or towns in the case of general indebtedness for water, sewer or light service. In such cases the debt limitation upon a 3/5ths majority vote of the agency residents is 10 percent of assessed value, or 5 percent true and fair value.

The above describes the constitutional limitation on financing powers of local agencies in the State of Washington. There are differences, however, between these constitutional restrictions and those contained in the statutes of the State of Washington. These statutory restrictions are described below and the variance between them and the similar constitutional provisions are explicitly noted.

## STATUTORY RESTRICTIONS CONCERNING FINANCING BY LOCAL AGENCIES IN GENERAL

As in the case of constitutional provisions, statutory concern with local financing has focused in the two areas of: operating tax rate limitations, and debt limitations. These are described in order below.

Operating Tax Rate Restrictions - Article 7, Section 2 of the state constitution, as amended by the 55th and 59th amendment, restrict the total property tax levy to $40 per thousand dollars of assessed valuation or 2 percent of the true and fair value of taxable property. The statutory sections affecting property tax limits are somewhat different.

Revised Code of Washington (RCW) 84.52.050, as amended, restricts all property tax levies to no more than 1 percent of true and fair value. This is half the limit provided for by the above constitutional section. Again this restriction does not include the tax rates levied by a port or public utility district. Also, once again such a combined tax rate may be exceeded by vote of a 3/5ths majority of taxing agency residents as provided by Article 7, Section 2 of the state constitution.

RCW 84.52.043 limits tax rates for various forms of local agencies in Washington. Specifically this section restricts taxing agencies to the following maximum tax rates per thousand dollars of assessed valuation:

| | | |
|---|---|---|
| 1. | State (for use in schools): | $3.60 |
| 2. | County: | 1.80 |
| 3. | Road district: | 2.25 |
| 4. | City: | 3.375 |

In addition, Section 84.52.043 limits tax rates by counties of certain classifications, and classified cities. All of these tax rate limits apply to regular property taxes, not to general indebtedness bond taxes.

Lastly there is one additional currently applicable statutory section restraining the levy of property taxes. This section, RCW 84.55.010, expires December 31, 1978. It provides that the levies of 1973 and following cannot increase in any taxing jurisdiction at more than 6 percent over the highest levy of the three prior years plus an amount equal to the change in assessed valuation attributable to construction or improvement of property in the district times the operating tax rate of the preceding year. This formula appears to allow tax revenue to grow approximately 6 percent a year to meet inflation plus an increase to serve new development within the taxing agency.

Debt Limit For All Local Agencies - Article 8, Section 6 limits debt for all local agencies. It has been described above. The state has provided, though, statutory law restrictions that effectuate the constitutional provisions. Again, however, there are some variations between the constitutional and statutory rules.

RCW 39.36.010 limits local indebtedness in the following ways:

1. Counties and cities are limited to indebtedness equivalent to 1-1/2 percent of assessed valuation without a vote.

2. Counties and cities are allowed to incur an indebtedness equivalent to 5 percent of assessed valuation with a 3/5ths majority vote.

3. In the case of cities and towns providing for sewer, light or water service, an additional indebtedness of up to 5 percent of assessed valuation is allowed. This, therefore, allows a city or town up to a total of 10 percent indebtedness upon a 3/5ths majority vote for sewer service.

4. All other districts are restricted to 3/4ths percent assessed valuation indebtedness without a vote and an equivalent of 2-1/2 percent assessed valuation with a 3/5ths majority vote.

TABLES OF AGENCY CHARACTERISTICS

The following four tables show the characteristics of various sewerage agencies as provided by law. They focus in four areas: (1) formation characteristics, (2) governing board characteristics, (3) functional powers, and (4) financing powers. While the tables summarize statutory provisions, actual wording of the relevant legislation and applicable judicial interpretation should be checked prior to any commitment based on the summary.

The tables are generally self-explanatory. In using the Financing Powers table, however, one note of caution is warranted. Constitution provisions

discussed in the next section state that agency indebtedness may not exceed 1-1/2 percent of assessed valuation without a 3/5th vote of residents. This provision would seem to apply where statutes do not expressly require bond elections over the 1-1/2 percent assessed valuation limit.

STATE AND LOCAL AGENCIES

Washington State Department of Ecology - The Department of Ecology now exercises powers formerly delegated to the State Water Pollution Control Commission (see RCW 43.21A). It reviews all plans and specifications for new sewerage systems, treatment or disposal plants, and sewerage improvement or extension projects in the State of Washington. It has the authority to require compliance from all local sewerage agencies with comprehensive basin plans and regulations adopted pursuant to the department's planning powers. It is also empowered to employ sanctions against plan violators.

The department is also the fiscal agent responsible for authorizing and disbursing state water pollution grants. It releases such grants only for federally-approved projects and only on a matching basis. For the powers of the former Water Pollution Control Commission generally, see Title 90 of the Revised Code of Washington. Some of the more important provisions of Title 90 are excerpted below.

RCW 90.48.080 - It shall be unlawful for any person to throw, drain, run or otherwise discharge into any of the waters of this state... any organic or inorganic matter that shall cause or tend to cause pollution of such waters.

RCW 90.48.260 - The Department of Ecology is designated the State Water Pollution Control agency for the purposes of the Federal Water Pollution Control Act. It may establish and administer a statewide point discharge permit system and engage in water pollution control planning.

RCW 90.48.270 - The commission shall have the authority to delineate and establish sewage drainage basins in the state for the purpose of developing and adopting comprehensive plans for the control and abatement of water pollution within such basins.

RCW 90.48.280 - ...following adoption of a comprehensive plan for any basin, the commission shall require compliance with such plan by any municipality or person operating or constructing a sewage collection, treatment or disposal system or plant, or any improvement to or extension of an existing sewage collection, treatment, or disposal system or plant within the basin.

RCW 90.48.290 - State grants are established. No grant shall be made which does not qualify for and receives a grant of federal funds under the provisions of the Federal Water Pollution Control Act.

Metropolitan Municipal Corporations - Metropolitan Municipal Corporations may be formed by two or more cities and may include incorporated and unincorporated territory in one or more county. At least one of the constituent cities must be a class 1 city (population 20,000 or more).

Metropolitan Municipal Corporations are authorized by law to engage in a variety of regional functions including regional water, sewerage, solid waste, transit, and power services. The exact services any particular "metro" can provide must be detailed in the formation resolution.

The agencies are also empowered to plan regional functions and to require compliance with such plans by constituent agencies especially in the wastewater field. They may levy property taxes and service charges and may finance major facilities by selling general indebtedness or revenue bonds. They are also authorized to form utility local improvement districts (LID's) for the purpose of local assessment financing.

Metropolitan Municipal Corporations are governed by a board appointed by constituent cities and county or counties. Board members serve at the pleasure of their respective appointing agencies, except ex officio members who may serve only so long as they remain in office within their constituent agencies.

Some important provisions of the enabling legislation are included below.

RCW 35.58.200 = If a metropolitan municipal corporation shall be authorized to perform the function of metropolitan water pollution abatement, it shall have the following powers in addition to the general powers granted by this chapter:

1. To prepare a comprehensive water pollution abatement plan...

2. To acquire...construct...operate and regulate the use of metropolitan facilities for water pollution abatement..... Sewer facilities which are owned by a county, city, or special district may be acquired or used by the metropolitan municipal corporation only with the consent of the legislative body of the county, city, or special district owning such facilities....

3. To require counties, cities, special districts and other political subdivisions to discharge sewage collected by such entities from any portion of the metropolitan area which can drain by gravity flow into such metropolitan facilities as may be provided to serve such areas when the metropolitan council shall declare by resolution that the health, safety, or welfare of the people within the metropolitan area requires such action.

4. To fix rates and charges for the use of metropolitan water pollution abatement facilities, and to expend the moneys so collected for authorized water pollution abatement activities.

5. To establish minimum standards for the construction of local water pollution abatement facilities and to approve plans for construction of such facilities by component counties or cities or by special districts, which are connected to the facilities of the metropolitan municipal corporation. No such county, city, or special district shall construct such facilities without first securing such approval.

6. To acquire....construct, add to, improve, replace, repair, maintain, operate and regulate the use of facilities for the local collection of sewage or storm water in portions of the metropolitan area not contained within any city or special district operating local public sewer facilities, and with the consent of the legislative body of any such city or special district, to exercise such powers within such city or special district and for such purpose to have all the powers conferred by law upon such city or special district with respect to such local collection facilities: Provided, That such consent shall not be required if the department of ecology certifies that a water pollution problem exists within any such city or special district and notifies the city or special district to correct such problem and corrective construction of necessary local collection facilities shall not have been commenced within six months after notification. All costs of such local collection facilities shall be paid for by the area served thereby.

7. To participate fully in federal and state programs under the federal water pollution control act (86 Stat. 816 et seq., 33 U.S.C. 1251 et seq.) and to take all actions necessary to secure to itself or its component agencies the benefits of that act and to meet the requirements of that act....)

Counties' Authority - The County Services Act states that the construction, operation, and maintenance of a system of sewerage and/or water is a county purpose. It expressly grants to the county all powers necessary for construction, operation, maintenance, of sanitary and storm sewers, outfalls, interceptors and all facilities necessary for sewage treatment and disposal, and/or systems of water supply for all or any portion of a county.

The act confers upon the county the right to incur indebtedness within the maximum debt ceiling established by the constitution. Such indebtedness may be incurred through general obligation bonds, revenue bonds, or by utility improvement districts and "in any lawful fiscal manner."

The act, however, reserves to a municipality the primary authority "to construct, operate and maintain a sewerage and water system within the boundaries of a municipal corporation."

Excerpts of statutory sections appear below.

RCW 36.94.020 - The construction, operation and maintenance of a system of sewerage and water is a county purpose....every county has the

power, individually or in conjunction with another county or counties, to adopt, provide for, accept, establish, condemn, purchase, construct, add to and maintain a system or systems of sanitary and storm sewers, including outfalls, interceptors, plans and facilities necessary for sewerage treatment and disposal, and a system or systems of water supply for either all or a portion of the county: Provided: That counties shall not have power to condemn sewerage and water systems of any municipal corporation or private utility.

Such county or counties shall have the authority to control, regulate and manage system or systems and to provide funds by general obligation bonds, revenue bonds, utility local improvement districts, assessments and in any lawful fiscal manner.

RCW 36.94.030 - County may adopt sewerage element of general plan.

RCW 36.94.040 - General plan must incorporate provisions of existing comprehensive plans relating to sewerage and water systems of cities, towns, municipalities, and private utilities to the extent they have been implemented.

Where a metropolitan municipal corporation is authorized to perform the sewage disposal or water supply functions, any...general plan shall be approved by the metropolitan municipal corporation prior to adoption by the county.

RCW 36.94.100 - Prior to commencement of work on any plan...it must be submitted for written approval to the Washington Department of Social and Health Services and to the Washington Department of Ecology.

RCW 36.94.160 - The county shall have the power to levy a tax on the system of sewerage and/or water operated by the county...not to exceed 8 percent per annum on the gross revenues to be paid to the county's general fund.

RCW 36.94.170 - The primary authority to construct, operate and maintain a system of sewerage or water within the boundaries of a municipal corporation which lies within the area of the county's sewerage or water general plan shall remain with the municipal corporation. As may be permitted by other statutes, a city or town may provide water or sewer service outside of its corporate limits.

RCW 36.94.180 - In the event of the annexation to a city or town of an area in which a county is operating a sewerage or water system, the property within the annexed area may be transferred to the city or town, subject to the assumption by the city or town of the county's obligations relating to such property...(see RCW 35.13.220 through 35.13.246; 35.13.250).

RCW 36.94.190 - Every county...shall be authorized to contract with the federal government, the State of Washington, or any city or town, within or without the county, and with any other county, and with any other

municipal corporation...and with any person, firm or corporation in and for the establishment, maintenance, and operation of all or a portion of a system or systems of sewerage or water supply.

RCW 36.94.230 - Utility local improvement districts...may be initiated either by resolution of the board of county commissioners or by petition signed by the owners...of at least 51 percent of the area of the land within the limits of the utility local improvement district.

Cities' Authority - State law classifies cities into four categories according to population. The various powers with respect to sewerage and water systems are summarized below. In general, all cities have some authority with respect to their operation and maintenance of sewerage and water systems, including the power to provide for services, either city owned or private, the power to charge fees, and the power to incur indebtedness.

In addition to providing sewerage services, of course, cities are authorized to provide the range of other local government services.

RCW 35.01 - Defines various classes of cities according to population at the time of its organization or reorganization:

| | |
|---|---|
| 1st Class | 20,000 or more |
| 2nd | 10,000 |
| 3rd | 1,500 |
| 4th (town) | 300 |

Cities and towns or unclassified communities operate under either commission or council-manager forms of government.

RCW 35.21.210 - Any city or town shall have power to provide for sewerage, drainage and water supply and to establish, construct, and maintain a system or systems of sewers and drains and...water supply, within or without the corporate limits of the city or town, and to control and regulate the system or systems.

RCW 35.22.280 - First class cities shall have power: to provide for levying and collecting taxes on real and personal property...and to prvide for payment of the debts and expenses of the corporation.

4. ...to borrow money for corporate purposes on the credit of the corporation, and to issue negotiable bonds (as authorized by charter, but no more than authorized by the new 39.36 maximum debt ceiling).

10. ...to provide for making local improvements and to levy and collect special assessments on property benefited.

14. ...to provide for waterworks...or authorize their construction by others...and to regulate and control the use and prices....

RCW 35.23.440 - Second class cities shall have power:

38. ...to adopt, provide for, establish and maintain a general system of sewerage, draining, or both, and the regulation therefore; to provide funds by local assessment on the property benefited....

49. ...to provide for assessment of taxes on real and personal property....

55. ...to provide for making local improvements, and to levy and collect special assessments on the property benefited thereby;

RCW 35.24.290 - Third class cities shall have power to:

4. Establish, construct, and maintain drains and sewers, and shall have power to compel all property owners on streets and alleys or within two hundred feet thereof along which sewers shall have been constructed to make proper connections therewith and to use the same for proper purposes (and, if owners fail to do so,) may cause such connections to be made.

RCW 35.30.020 - Unclassified cities are empowered to construct a sewer ...and to keep same in repair; costs shall be paid from special fund... created by a tax on all property within limits of city...and shall not exceed $5 per thousand dollars of assessed valuation per year.

Sewer and Water Districts - Sewer and water districts may be formed in incorporated and unincorporated areas to provide sewer, water and public power services. They may construct sewerage facilities pursuant to a comprehensive improvement plan, but such a plan must be approved by the county legislative authority and or Boundary Review Board. Also, before these districts may construct sewerage facilities within an incorporated area, they must obtain approval from the city governing body.

The provision of sewerage services by a water district may be made in the same manner as a sewer district's providing sewerage services under RCW 57.08.065. Both types of agency may levy taxes, service charges and connection charges. They may issue general indebtedness or revenue bonds to finance construction of facilities. (For indebtedness restrictions see the discussion on constitutional and statutory debt limitations.)

Both kinds of districts may form utility local improvement districts for assessment financing of projects which benefit specific properties. Assessments, like the other charges and taxes leviable by these districts, can be collected through foreclosure sale if sufficiently delinquent.

Below are summarized and excerpted certain important sections of the sewer district and water district enabling statutes.

Sewer Districts-Title 56:

RCW 56.08.010 - ...a sewer district may lease real or personal property necessary for its purpose for a term of years for which such leased

property may reasonably be needed...may compel all property owners within the sewer district...to connect their private drains.

RCW 56.08.060 - Sewer district may enter into contract (with any political subdivision, private individual or organization) and a sewer district may provide sewer service to property owners outside the limits of the sewer district.

RCW 56.16.020 - Revenue bonds require majority vote of the people,... term limited to 30 years.

RCW 56.16.035 - Additional revenue bonds authorized if...general comprehensive plan and bonds have been authorized...and authorized funds are insufficient...commissioners may authorize additional revenue bonds without voter approval...limited to 20 percent of authorized indebtedness.

RCW 56.16.050 - Incorporates constitutional debt ceiling; limits term to 30 years.

RCW 56.20.010 - Sewer district may establish utility local improvement district for special assessment purposes.

Water Districts-Title 57:

RCW 57.08.065 - In addition to the powers now given water districts by law, they shall also have the power to establish, maintain and operate a mutual water and sewer system or a separate sewer system within their water district area in the same manner as provided by law in connection with water supply systems.

In addition, a water district constructing, maintaining, and operating a sanitary sewer system may exercise all powers permitted to a sewer district under RCW 56, including but not limited to, the right to compel connections to the district's system, liens for delinquent sewer connection charges or service charges and all other powers presently...or hereafter granted to such sewer districts. Provided: ...any comprehensive plan for sewers is subject to approval by the same county and state officials as would be empowered to approve such plans adopted by a sewer district.

Irrigation Districts - Irrigation districts may be formed by affected property owners to provide local irrigation, drainage or sewerage services. They may include areas of more than one county, and appear to be able to include incorporated areas as well. Voting in district elections is reserved to property owners. In districts of more than 200,000 acres, landowners get one vote for the first ten or less acres they own, and one additional vote for lands owned over ten acres.

District financing alternatives include revenue bonds and general issue bonds. The general issue bonds are not secured by taxes, but are rather secured by assessments to be made against district properties on the basis

of benefits conferred by bond-financed district facilities. In addition, the costs of maintaining and operating district facilities may be paid through assessments on district properties in proportion to maintenance and operation benefits conferred.

The characteristics of these districts are summarized in the tables of the next section of this report. Several statutory provisions are excerpted below.

RCW 87.03.015 - Any irrigation district, operating and maintaing an irrigation system, in addition to other powers conferred by law shall have authority:...

3. To construct, repair, purchase, lease, acquire, operate, and maintain a system of drains, sanitary sewers and sewage disposal or treatment plants as herein provided.

RCW 87.03.045 - A person 18 years old...who holds evidence of title to land in the district or proposed district shall be entitled to vote therein, except that any such person shall only be entitled to vote in a district comprising 200,000 or more acres...if he holds title or evidence of title to land other than land platted or subdivided into residence or business lots and not being used for agricultural or horticultural purposes....

RCW 87.03.240 - Assessments made in order to carry out the purpose of this act shall be made in proportion to the benefits which accrue to the lands assessed....

Diking and Drainage Sewer Improvement Districts - Under the provisions of RCW 85.08 ff, sewerage services can be furnished by Diking and Drainage Districts. Although the statutes appear intended to primarily provide drainage services, they also authorize the construction of sanitary sewers and septic tanks.

These kinds of districts may be formed in either incorporated or unincorporated areas. They appear to have been designed, however, primarily to serve rural lands in projects of relatively modest scope. Project financing is based, as in the case of irrigation districts, on assessments levied on district lands. The assessments are based on benefits conferred on properties by district projects.

District voting is based on land ownership. Two statutory provisions are excerpted below.

RCW 85.08.020 - Districts authorized-Area in city or town. Whenever four or more persons whose lands will be benefited thereby, desire to have improvements constructed for drainage, sewerage or protection from overflow, ...of any contiguous body of land situated in the same county, proceedings for the construction of such improvements may be had as provided in this chapter: Provided, That when such contiguous body of land is situated

wholly within an incorporated city or town, the city or town may, through its council or other legislative body, have all of the powers and exercise all of the functions of a drainage district under this chapter, if and when it shall declare its right to do so by ordinance.

RCW 85.08.240 - Cost of improvement, how paid-Assessment of benefits-Payment in bonds or warrants-Installments-Call for Bonds-Register. The cost of improvement shall be paid by assessment upon the property benefited. At the hearing provided for in RCW 85.08.160, the board of county commissioners shall determine in what manner and within how many years said assessment shall be paid, and whether the evidence of indebtedness for the cost of said improvement shall be bonds or warrants.

OTHER STATUTORY PROVISIONS

Local Boundary Review Boards - Revised Codes of Washington, 36.93 ff, provide for the creation of Local Boundary Review Boards. Under the statute these entities are created in all Class A counties (210,000 persons or more) and other counties as desired by local officials and residents.

The boundary review boards may take jurisdiction over and review cases dealing with the creation, dissolution, consolidation or change of boundary of cities, towns, sewer districts, water districts, irrigation districts, and others. It also may hear cases involving the extension of sewerage services outside the boundaries of towns, cities, and special districts.

Boundary review boards are not required to take jurisdiction over district boundary changes in all cases. They must, though, hear cases under any of the following circumstances:

1. when the board chairman or three board members request review of a boundary change,

2. when any affected governmental unit requests board review,

3. when 5 percent of an agency's voters, or owners of 5 percent of an agency's assessed valuation request review.

As a result of review, the boundary review board must either approve, modify, or disapprove a proposed boundary change. If a proposed change is disapproved, it may not be proposed by the local agency again for at least 12 months.

The purposes and objectives of boundary review boards are the following:

- the preservation of natural neighborhoods and communities
- the use of natural physical boundaries (e.g., waterways)
- the rational provision of basic public services

- the discouragement of cities of too small a size
- the dissolution of inactive special purpose districts.

Local boundary review board decisions are appealable. In some cases there may be appeal to the entire board. In all cases, appeals may be taken to the superior court. Board decisions may be overturned by the court if violative of procedural due process, if not based on material or substantial evidence, or if arbitrary and capricious.

Interlocal Cooperation Act - The Interlocal Cooperation Act is a general state act allowing cooperative efforts and operations among local, state and federal agencies. The agencies covered by the act include cities, towns, counties, metropolitan municipal corporations, state agencies, and the federal government. The act basically permits these agencies to exercise in concert any powers common to them. Note that the act does not provide for interlocal cooperation among or with sewer, water, irrigation or diking and drainage sewer improvement districts.

Cooperative efforts can be exercised either by the constituent agencies under contract to one another, or through an umbrella agency created by the constituent agencies. Although operations under either alternative are not fundable by direct tax levies, common efforts may be financed in a number of ways. Financing methods include revenue from member agency contributions, fees and charges levied for the use of commonly owned facilities, or grants and loans.

The more important provisions of the act are summarized and excerpted below.

RCW 39.34.020 - "Public agency" means city, town, county, port district, fire protection district, school district, air pollution district, Indian tribe, metropolitan municipal corporation, any agency of the state or federal government, any political subdivision of another state.

RCW 39.34.030 -

1. Any power or powers, privilege or authority exercised or capable of exercise by a public agency of this state may be exercised and enjoyed jointly with any other public agency of this state having the power or powers...and jointly with any public agency of any other state.

2. Any two or more public agencies may enter into agreements for joint or cooperative action pursuant to the provision of this act. Appropriate action by ordinance or resolution...of the participating public agencies shall be necessary before any such agreement may enter into force.

3. The agreement shall specify:

   a. Duration

   b. Precise organization, composition and nature of any separate legal entity created together with powers delegated.

c. Purpose

d. Manner of financing the joint or cooperative undertaking...establish budget

e. Methods for partial or complete termination of agreement

f. Any other matters.

4. If agreement does not establish a separate legal entity, the agreement shall, in addition to items a, c, d, e, f, contain:

a. Provision for administrator or joint board

b. Manner of acquiring, holding and disposing of real and personal property.

RCW 39.34.050 - Circumstances for submission of agreement for state approval.

RCW 39.34.060 - Power of members to sell, lease, appropriate funds to umbrella agency.

RCW 39.34.070 - Loans or grants may be accepted by umbrella agency if member agencies could accept.

Agency Approvals - Local agencies planning to construct sewer systems or improvements must obtain approvals from a number of agencies. This brief section summarizes the more important approvals that must be obtained by local sewerage agencies.

1. The State Department of Ecology must approve any and all plans for sewerage systems or major improvements in the state (see RCW 90.48.110).

2. Metropolitan municipal corporations that are "chartered" to perform regional wastewater services must approve significant sewerage projects undertaken by any constituent agency, including counties, cities, water and sewer districts, etc. (see RCW 35.58.010).

3. Counties wishing to provide sewer services to residents of cities or towns must obtain approval to do so from the cities (see RCW 36.94.170).

4. Cities proposing to provide sewerage services outside of city boundaries may be required to obtain local boundary review board approval (depending on whether one exists in the county and if it chooses to take "jurisdiction"). In addition, the extension of city sewerage may not conflict with the county's sewerage plan if the county has in fact adopted one under RCW 36.94.

5. Sewer districts and water districts functioning as sewer districts must obtain approval of their comprehensive plan for sewerage services

from the county director of health and a county designated engineer. Before such districts can be newly formed, approval must be obtained from the county legislative authority or local boundary review board (see RCW 56.02.070). In addition, before a district may operate within a city, it must obtain approval from the legislative body of that city (see RCW 56.08.070).

6. Irrigation and drainage and diking improvement districts may be required to obtain local boundary review board approval before they may be formed or extend sewerage services outside their boundaries.

SUMMARY

Cities, counties, and metropolitan municipal corporations seem to have the broadest powers. All of these agencies are authorized to coordinate wastewater management planning with the planning of other essential public services such as water supply and transportation.

In addition, cities, counties, and metropolitan municipal corporations may finance sewerage projects with general obligation bond issues of up to 5 percent of true value or 10 percent of assessed value of local properties. They are, moreover, all authorized to finance with revenue and local assessment bonds.

Sewer districts, water districts, irrigation districts, and diking and drainage sewer improvement districts are also empowered to provide varying levels and types of sewerage services. These districts, too, have considerable operational and financing powers and may be desirable servicing agencies for economic or administrative reasons. It should be noted, however, that the power of irrigation and drainage and diking districts to act cooperatively with other agencies is not specified in the Washington statutes. This apparent lack of statutory authority could limit these agencies functioning within regional wastewater systems.

TABLE 1
STATE OF WASHINGTON
SEWERAGE AGENCY CHARACTERISTICS
FORMATION

| Agency | How Initiated | Formation Election | Incorporated/ Unincorporated Service Area | Annexation Process | Miscellaneous |
|---|---|---|---|---|---|
| County RCW 36.67 | -- | -- | Unincorporated | -- | -- |
| City/Town RCW 35.67 | Petition (20% voters) | Majority vote | Incorporated | Election in annexed area | -- |
| Metropolitan Municipal Corp. -RCW 35.58 | Resolution or petition | Majority vote in and outside central city | Incorporated and unincorp. in one or more county | Election in annexed area | Must contain at least two cities (one a 1st class city) |
| Sewer/Water District RCW 56.16/57.08.065 | Resolution or petition | Majority vote | Incorporated and unincorporated | Election or 60% petition in annexed area | -- |
| Irrigation District RCW 87. | Petition of landowners | 2/3 majority vote[1] | Unincorp. in one or more county | Petition and election in annexed area | -- |
| Diking & Drainage Dist. / Sewer Improvement Dist. RCW 85.08&85.16 | Petition[2] | Majority vote[1] | Incorporated and unincorp. in one or more county | Petition and bond resolution | -- |

1 - Voting related to land holding.
2 - May be by County Board of Commissioners resolution to curb a health hazard.

TABLE 2
STATE OF WASHINGTON
SEWERAGE AGENCY CHARACTERISTICS
GOVERNING BOARD

| Agency | Governing Body | Number of Members | Selected By | Term |
|---|---|---|---|---|
| County<br>RCW 36.67 | County Board of Commissioners | 3 | Resident voters | 4 Years |
| City/Town<br>RCW 35.67 | Council/Manager or commission | 5 or 7 or 3 | Resident voters | 4 Years |
| Metropolitan Municipal Corp. -RCW 35.58 | Metropolitan Council | Depends on constituent agencies | Governing boards of constituent agencies | At pleasure of selecting agency* |
| Sewer/Water District<br>RCW 56.16/57.08.065 | Board of Sewer/Water Commissioners | 3 | Resident voters | 6 Years |
| Irrigation District<br>RCW 87. | Board of Directors | 3 or 5 | Landowner voters or resident voters | 3 Years |
| Diking and Drainage District/ Sewer Improvement District<br>RCW 85.08&85.16 | District Supervisors | 3 | Landowners voters | 4 Years |

*Ex officio members leave office when they leave office of appointing constituent agency.

TABLE 3
STATE OF WASHINGTON
SEWERAGE AGENCY CHARACTERISTICS
FUNCTIONAL POWERS

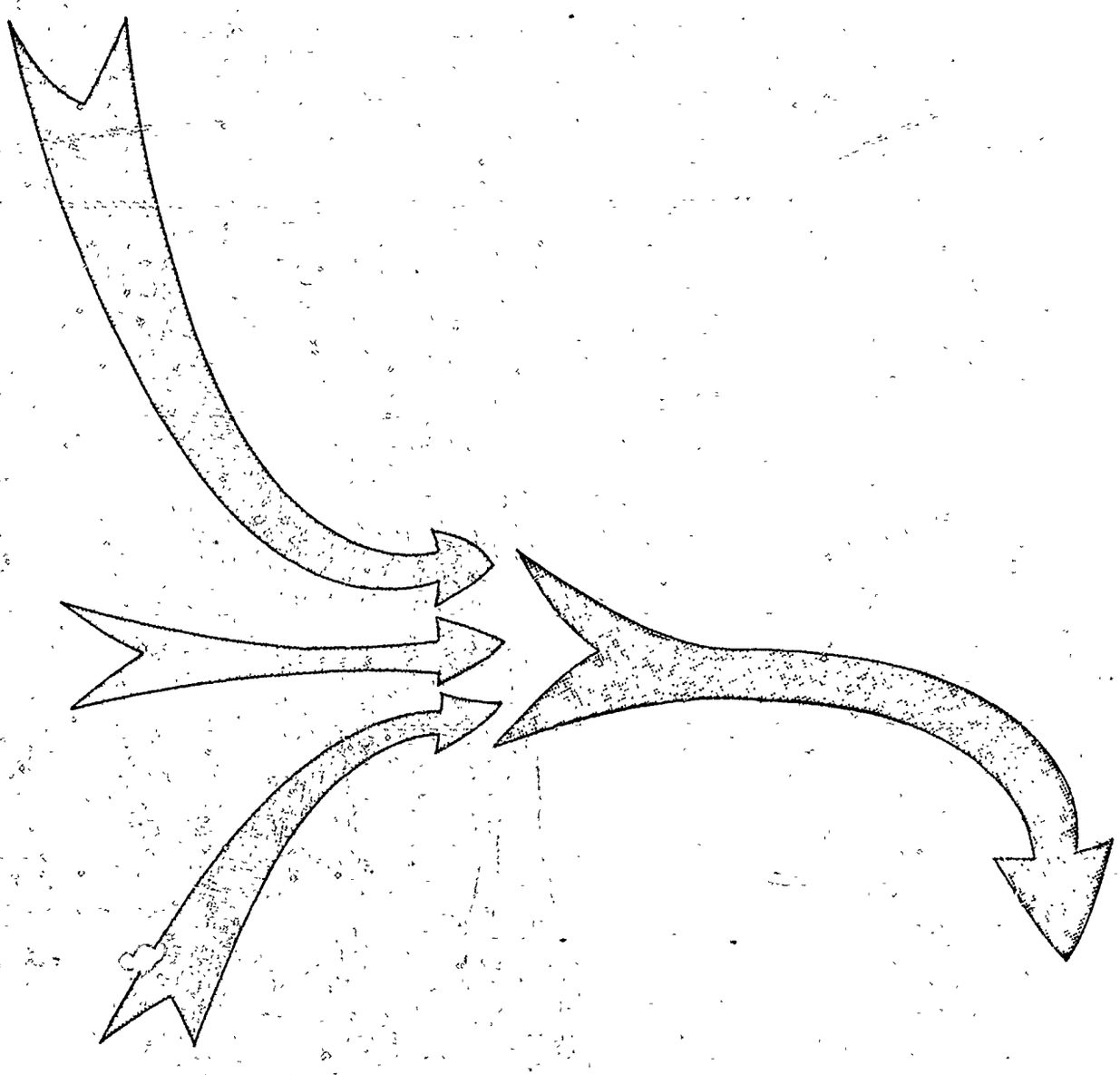
| Agency | Planning | Collection | Treatment | Disposal | Other Services | Provisions for Cooperation with Other Agencies | Power of Ordinance | May Provide Local Assessment Financing | Miscellaneous |
|---|---|---|---|---|---|---|---|---|---|
| County RCW 36.94 | Regional | Yes | Yes | Yes | All county functions | 36.94.040 and ICA[1] | Yes | Yes | Cities have primary authority to operate facilities within city |
| City/Town RCW 35.67 | Citywide | Yesq | Yes | Yes | All municipal functions | 35.67.300 and ICA | Yes | Yes | Facility construction usually requires vote 35.92.070 |
| Metropolitan Municipal Corp. -RCW 35.58 | Regional | Yes | Yes | Yes | Water, solid waste, transit[2] | ICA | Yes | Yes | May require local compliance with regional plans |
| Sewer/Water District[3] RCW 56.16/57.08.065 | Local system | Yes | Yes | Yes | Water district: street lighting | 56.08.060 | Yes | Yes | Can't include city without city consent |
| Irrigation District RCW 87. | Local system | Yes | Yes | Yes | Irrigation, power, domestic, water, drainage | None specified | No | Yes | -- |
| Diking and Drainage Dist. / Sewer Improvement Dist. RCW 85.08&85.16 | Local collection | Yes | Limited | Limited | Diking and drainag | None specified | Limited | Yes | Local assessment financing form |

1 - Interlocal Cooperation Act, RCW 39.34-.
2 - See RCW 35.58.050 for other regional functions. Constituent agencies may continue to provide non-regional municipal services.
3 - Water districts providing sewerage services may exercise powers of a sewer district, RCW 57.08.065.

TABLE 4
STATE OF WASHINGTON
SEWERAGE AGENCY CHARACTERISTICS
FINANCING POWERS

| Agency | Power to Tax | Power to Levy Rates & Charges | Uniform Charges Required | Lien for Delinquent Charges | Other | General Indebtedness Bonds | | Revenue Bonds | | Refur Bor |
|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | Election[1] | Limitations | Election | Limitations | |
| County RCW 36.67 | Yes | Yes | For each class | Yes | Charges must meet costs[2] | Required over 0.75 % A.V. | 8% interest maximum | None required by statute[1] | No interest max-30 year | Ye |
| City/Town RCW 35.67 | Yes | Yes | For each class | Yes | Special tax allowed 35.21.280 | Always required | No interest max-30 year max | None required by statute[1] | 30 year max | Ye |
| Metropolitan Municipal Corp RCW 35.58 | Yes | Yes | No restrictions | No Provision | - | Required over 0.75 % A.V. | No interest max-40 year max | None required by statute | None | Ye |
| Sewer/Water District[3] RCW 56.16/57.08.065 | Yes | Yes | For each class | Yes | Charges must meet costs[2] | Always required | No interest max-30 year max | None required[4] | 30 year max | Ye |
| Irrigation District RCW 87. | No | Assessments | Per benefit | Yes | - | Always required | 8% interest maximum | Required if over 10 yr term | No | Ye |
| Diking and Drainage District/Sewer Improvement District RCW 85.08 & 85.16 | No | Assessments | Per benefit | Yes-unpaid assessments | - | N.A. | N.A. | N.A. | N.A. | Ye |

1 - Requires governing board approval only for facilities conforming with an adopted regional plan.
2 - Where revenue bonds issued, but costs of general indebtedness can be tax supported.
3 - Water district providing sewerage services may exercise powers of a sewer district, RCW 57.08.065.
4 - Except Water District acting as a Sewer District requires majority vote approval.



# SECTION 801.3

## FORMULATION AND EVALUATION OF ALTERNATIVE INSTITUTIONAL PLANS FOR WASTEWATER MANAGEMENT IN THE URBAN PLANNING AREA

WATER RESOURCES STUDY

METROPOLITAN SPOKANE REGION

SECTION 801.3

# FORMULATION AND EVALUATION OF ALTERNATIVE INSTITUTIONAL PLANS FOR WASTEWATER MANAGEMENT IN THE URBAN PLANNING AREA

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# SECTION 801.3
# FORMULATION AND EVALUATION OF ALTERNATIVE INSTITUTIONAL PLANS FOR WASTEWATER MANAGEMENT IN THE URBAN PLANNING AREA

## Scope and Objectives

The objectives of this and the following section is to develop plans for orderly and successful implementation of the recommended engineering plans for wastewater management of the urban planning area. The two interrelated elements of implementation are the institutional arrangements and the financial plans carried out by means of these institutions. To be orderly and successful, the institutional and financial arrangements must be capable of not only implementing the plan but also have the continuing capability for operation, maintenance, expansion, and upgrading through the years.

The general approach taken toward the goals of plan development for institutional and financial arrangements is as follows. Section 801.2 presents the results of a research of the constitutional and statutory authority of sewerage agencies in the State of Washington. This section begins with an inventory and evaluation of existing sewerage agencies in the urban planning area. The existing agency capability and the institutional means available through statutory authority are then compared with the needs of the engineering plan to develop alternative plans. Finally, with respect to institutions, the alternatives are evaluated and a plan

selected for recommendation. In Section 801.3, which follows, the financial requirements of the engineering plan, previously developed in Section 704.1, are summarized and compared with the alternative financial resources available under the selected institution plan. Evaluation of financing alternatives follows, concluding with a selected financial plan.

## Role of Institutional Planning

Introduction - To meet its objectives the critical role of local government institutions in implementing any effective water quality control program must be recognized. Federal and state legislation has expressly identified the role of local governmental institutions in regional water quality programs. Not only must the cooperation of local agencies be received to make a successful program, but the sewerage investments and facilities of local agencies must be built upon to minimize the cost of regional facilities. Federal and state agencies want assurance that local governmental agencies are capable of implementing water quality control plans developed under federal and state legislation. Because of the considerable size of state and federal grants, these agencies want to be sure that the money will be most effectively used on a coordinated, region-wide program. Federal and state legislators have expressly defined the functions and powers of the management agencies responsible for the recommended plans. Agencies that cannot meet these guidelines will not qualify for these grants.

Not only does state and federal legislation emphasize a regional approach to sewerage projects, but regional cooperation ensures that these sewerage projects can be provided at the lowest cost to homeowners in the area and also that regional programs can be provided for the lowest capital cost with little or no duplication in wastewater treatment facilities.

Whether existing institutions are able to implement the recommended plans depends upon their ability to meet the constitutional or statutory requirements of a management agency. If existing institutions are unable to function as management agencies, institutional change is required. New local agencies may need to be formed and new institutional arrangements may have to be developed to provide for a suitable management agency.

The selection criteria for the most appropriate form of management agency and of local agencies are discussed below. The selection criteria are judged mainly in two broad areas:

1. Institutional Capabilities, i.e., the availability of broad wastewater powers to manage, operate, construct and plan for future as well as present sewerage needs.

2. Financial Capabilities -- This is the power to provide the means for financing annual operation and maintenance costs as well as initial capital construction costs at the lowest costs to the residents of the region and allocated in the most equitable manner among these residents.

Institutional Capabilities - Because local institutions are responsible for the implementation of this basin plan, the institutional capabilities of existing institutions must be examined. These capabilities, coupled with the physical configurations of the recommended plan, form the basis of the recommended institutional arrangements. Most of the powers of local agencies result from state legislation and are applicable to general types of agencies rather than being specific to any particular agency.

Financing Capabilities - The financing arrangement must provide funds for annual expenses such as administration, operation and maintenance, and purchase of any existing local facilities, as well as provide a means for raising the local share of capital costs to match state and federal water pollution control grants. The financing plan must also consider the method of sharing costs both among the existing agencies in the region and among the sewerage customers which means that the estimated costs per homeowner must be developed.

Goals of Institutional and Financial Planning - One of the primary goals of an institutional and financial plan is to stimulate the decision-

making process. The institutional and financial plan should be designed to satisfy the following objectives:

1. To encourage facilities planning to proceed as rapidly as possible. This avoids the unnecessary inflation costs which delays would cause.

2. To allow sufficient discretion in implementing the wastewater management program for individual agencies to reach mutually acceptable agreements.

3. To provide sufficient flexibility for on-going project planning to integrate smoothly into any institutional reorganization which may occur at the regional level. This includes, but is not limited to, possible formation of a metropolitan municipal corporation or some other form of regional consolidation.

4. To enable each project to minimize interest costs.

5. To assess the financial impact of each project on individual users.

6. To demonstrate how initial costs and annual expenses may be allocated among participating agencies in an equitable manner for each project.

7. To meet state and federal revenue program requirements within the limitations of available information.

8. To identify projects which have special institutional or financial difficulties and to suggest possible solutions.

## Existing Sewerage Agencies

General - Eighteen separate public entities with sewerage powers now exist within the urban planning area. The levels and degrees of service vary widely among these entities with a majority of them presently providing no sewerage service at all.

Table 1 shows the existing agencies in the Spokane Urban Planning Area with wastewater management authority. Not all of these agencies are engaged in wastewater functions, but the list shows those with the legal powers to potentially provide some wastewater service.

Table 2 shows a summary of sewerage functions that are currently performed in the urban planning area. The table shows that in the entire urban planning area only the City of Spokane currently provides sewerage facilities to more than a small local area.

Of the eighteen agencies inside the urban planning area with some sewerage powers, only six provide some level of sewerage service. Outside the City of Spokane, no other agency currently owns and operates sewerage facilities for its entire population. Those sewerage facilities that do exist serve only local pockets of development.

An analysis is made below of sewage service currently provided to determine what local areas within the urban planning area already are providing sewage functions and to determine the level of this service. The analysis is also to determine whether any existing sewerage facilities investments will benefit the proposed sewerage program.

City of Spokane - The City of Spokane operates a 40 mgd treatment plant which discharges into the Spokane River. The city also operates about 610 miles of sewers, most of which are combined sanitary and storm sewers. The city is upgrading the plant to provide secondary treatment plus 85 percent phosphorous removal. Cost estimates to upgrade the treatment plant are $45,800,000 including federal grants of $34,350,000 and state grants of $6,752,000. Spokane will pay its share of the costs from reserve funds on hand. Currently, there is one sewer revenue bond outstanding in the amount of $348,000. No general obligation sewer bonds are outstanding. The city currently levies a sewer service charge of $3.50 per month for a single family dwelling unit. The current sewerage service population of Spokane is about 170,000.

The expanded and upgraded City STP is an essential element in the recommended plan. Likewise, the existing internal sewerage system of the City of Spokane would continue its function under the recommended plan. There is a need for extensive correction of combined sewer overflow and local flooding from the combined sewer system. The estimated construction cost of these corrections is $45,000,000.

The City of Spokane also owns and operates the following interim facilities all in the North Spokane service area:

| Subdivision | Population Served |
|---|---|
| Cozza-Calkins | 1,500 |
| Northwest Terrace | 900 |
| Panorama Terrace | 18 |
| Sundance Hills | (200 homes design cap.)* |
| Pacific Park | (60 homes design cap.)* |

* These facilities have been in service for less than a year.

The Cozza-Calkins and Panorama Terrace service areas would be integrated into the initial stage of construction of community sewerage for the North Spokane area and the respective treatment facilities would be phased out at that time. The other interim facilities all west of Five Mile Prairie are projected to remain in service to 1990 under the recommended plan at which time conveyance facilities would be extended into this area for diversion of flows to the city sewer treatment plant. Further building pressure in this area could move the conveyance construction date ahead.

Spokane County - Spokane County does not own any sewerage facilities but has contracted to operate three interim treatment facilities for subdivision developers. The three interim works located within the urban planning area are summarized below:

| Subdivision | Population Served | Monthly Service Charge |
|---|---|---|
| Aloha Addition | 126 | $5.50 per SFD |
| Castle Addition | 123 | 5.50 per SFD |
| Camelot Addition | 42 | 5.50 per SFD |

The monthly service charges may be adjusted by the Board of County Commissioners to ensure that these charges cover all the costs of operating the treatment facility. There is currently no county bonded indebtedness outstanding for the above facilities. The county is currently negotiating to acquire the Fairwood treatment facilities which are presently operated by the Whitworth Water District #2.

All of the above interim facilities are in the North Spokane service area. The interim treatment facilities have no permanent place in the recommended plan and would only serve until their respective service areas are connected to the community sewer. The small collection systems would be mostly useable for incorporation into the community system.

Town of Millwood - The Town of Millwood operates a small treatment facility and collection system serving only about 90 mainly commercial customers. The facilities were constructed in 1963 at a total cost including collection sewers of about $59,000. No sewer bonds are currently outstanding. Sewer charges average about $2.50 per month.

The small treatment facility has no permanent place in the community sewerage plan for the Spokane Valley. Most of the existing collection system would be integrated into the community collection system.

Vera Irrigation District #15 - Vera Irrigation District #15 owns and operates three developer-donated treatment facilities as follows:

| Subdivision | Population Served |
|---|---|
| Belle Terre | 40 |
| Opportunity Terrace | 90 |
| Timberlane Development | 90 |
| | 220 |

The population served represents about 100 connections total. There are currently no sewerage bonds outstanding.

All of the interim facilities operated by Vera Irrigation District are in the Spokane Valley service area and would have no permanent place in a community system. The associated collection system would be mostly incorporated into a community collection system.

Whitworth Water District #2 - Whitworth Water District #2 operates and maintains the Fairwood sewage system through a contract with the developer. Spokane County is currently attempting to acquire the facilities which include stabilization lagoons. The facilities serve a population of about 3,200. No sewerage bonds are currently outstanding.

This facility is in the North Spokane service area. The lagoons have no permanent place in the recommended plan but the extensive collection system would be integrated into the necessary internal sewerage system for North Spokane area.

Liberty Lake Sewer District #1 - Liberty Lake Sewer District #1 was formed in 1973. The district is negotiating to purchase the facilities owned privately. Present sewerage facilities serve a population of 280. In November 1974, the district's voters approved a $1,700,000 revenue bond to fund proposed sewerage improvements.

The Liberty Lake area is remote from the main community area of Spokane Valley and would not be feasibly connected until a late stage of development when trunk sewers are extended. Whatever treatment facilities are constructed with the bond issue would have prospects of operating for a number of years before possible replacement by connection to the Spokane Valley trunk system.

## Elements of Institutional Alternatives

Initial Screening - The constitutional and statutory bases for various institutions available in the State of Washington are described in Section 801.2.

In Washington, there are essentially four special district forms which are most suitable to provide sewerage functions. These are counties, cities, sewer districts, and metropolitan municipal corporations. In addition to these four forms, water districts may be granted the same powers as sewer districts under certain conditions. Irrigation districts and sewer improvement districts have specialized sewerage powers.

Therefore, the list of agencies for consideration can be summarized as follows:

- metropolitan municipal corporation
- county
- city
- sewer and water district
- irrigation district
- diking and drainage districts
- sewer improvement district

Another agency form considered is an inter-local cooperation agency.

Several of the above agency types may be eliminated from further consideration. An irrigation district may be formed in unincorporated territory only, and its voting structure, which is based on land ownership, is not a satisfactory vehicle to represent public opinion. Diking and drainage districts and sewer improvement districts also have a landowner voting structure. The three above districts are generally intended for local improvement projects and are not intended to manage a regional sewerage program. The other agency types merit further consideration and are discussed below with important features summarized in Table 3.

Some of the most important features to be considered in evaluation of the role each agency can play are the following:

- Formation Procedure -- Difficulties must be kept to a minimum.
- Area Includable -- Must be all the areas of the engineering project.
- Governing Board -- Must be a workable number able to administer the regional organization and determine regional policy.
- Financing Powers -- Must be sufficient to carry out its functions.
- Financing Resources -- Must be adequate to meet all annual and capital expenses.
- Administrative Structure -- Must be adequate to meet existing and potential future regional needs for planning and coordination.
- Regional Institutional Arrangement -- Must serve as a grounds for the various existing entities to cooperate in their common sewerage problems.

Metropolitan Municipal Corporation - The Metropolitan Municipal Corporation Act (Metro Act) was written in 1957 to provide an agency capable of managing a regional sewerage program such as this one. The Act was used to provide the administrative vehicle for the Seattle metropolitan area. There, the main purpose of the regional agency was to coordinate and manage the on-going wastewater programs of many existing agencies. In the Seattle area, the City of Seattle, fourteen towns and numerous sewer districts were working independently towards solution of sewage problems. The Seattle "Metro" was formed to coordinate existing sewerage programs and develop and implement a regional approach. There are several important ways in which the Seattle experience differs from the situation in the Spokane urban planning area.

Firstly, except for the City of Spokane and a few other isolated areas, there is no sewerage service provided or sewerage districts already formed. Secondly, the Metro Act requires at least two cities in the urban area. There are only two cities in the Spokane urban area, the City of Spokane and the Town of Millwood. This means that the Town of Millwood with a sewered population of about 200 could exercise a veto power over the entire metro formation. Thirdly, the Metro Act is intended to set up a wholesaling operation providing services to local agencies which in turn provide the direct customer contact. The Act does, however, enable collection systems construction and maintenance, so this point is not important except that a local area which is not in a "member" political jurisdiction cannot be represented directly on the metro governing board. Fourthly, there is presently little incentive to either

of the cities in the urban area to form a metropolitan municipal corporation. The City of Spokane which would be expected to take the lead if such an agency is to be formed is presently constructing its own treatment plant which will serve its needs for many years to come. Once the wastewater plan has brought much of the urban metropolitan area up to similar levels of sewerage service by implementation through other institutional arrangements, then one regional management agency may be indicated for the entire urban metropolitan area.

Spokane County - Spokane County may provide all sewerage functions in the unincorporated areas of the county, and may perform these functions for cities as well through an inter-local cooperation agreement. The county can form a local utility improvement district (LID) to provide collection sewers to those not presently receiving sewerage service. The county requires an adopted sewerage master plan before it may provide sewerage functions.

Spokane County is a likely selection to manage the wastewater program in the unincorporated areas throughout the urban planning area and would likely serve the Town of Millwood by contract, as well. In those areas where a local agency currently provides some sewerage functions, the county will also have to obtain approval to provide this service or it may contract to provide the services in the future. The City of Spokane, however, which not only has the existing physical plant but also the operational experience in sewerage management would not have the need or desire for county services in these fields.

City of Spokane - The City of Spokane is capable of continuing the management of its own sewerage program and is currently upgrading its sewage treatment plant to provide full secondary treatment with phosphorus removal. The future role assigned to the City of Spokane in regional wastewater management must recognize these facts and, in addition, that Spokane is the recipient of large state and federal grants toward implementation of their program. The City may legally provide sewage treatment and disposal services to areas outside the city limits through inter-local cooperation arrangements if the City chooses to adopt such a policy.

Sewer and Water Districts - Sewer and water districts are included together because the statutes granting water districts sewerage powers give them the powers of a sewer district. A regional management program using a sewer district as a management vehicle is not a likely candidate. A large sewer district could be formed over the entire urban planning area, and this would require the same type of contract as with the county except that any of the existing water districts would have to go out of the business. A sewer district has less broad financing powers than the county, so the selection of a sewer district would not be optimal. Another optional use of sewer districts would be to form them in all those areas scheduled to receive sewerage service and not yet served by either a sewer, water or irrigation district. These agencies could sign contracts to join together to provide sewerage service; however, the inter-local cooperation act does not provide for use by sewer, water, or irrigation districts so a

separate agency probably could not be formed to manage the program. One sewer district would have to be appointed the lead agency, and the other district would contract with the lead agency for treatment and disposal of sewage. An advantage of formation of a number of sewer districts is that collection system operation and customer contact would remain on a completely local basis.

Spokane Regional Planning Conference. The Spokane Regional Planning Conference is a vehicle created by the City of Spokane and Spokane County under provisions of RCW 35.63.070 and 36.70.060. It is recognized by the Governors office as the clearing house for planning in the Metropolitan Spokane area. It is certified by HUD as meeting the qualifications for a regional planning agency in the field of general planning. In the area of transportation planning, it is recognized by the Urban Mass Transit Administration and by the Federal Highway Administration.

The Conference is supported by funds from the City and County and by grants from federal agencies for specific projects. The Spokane Regional Planning Conference has no legal basis for becoming an implementation agency. The City and County have inter-local cooperation powers for implementation as described above. These powers would not result in a separate entity but operate within the existing City and County institutions. The Spokane Regional Planning Conference does not have a place as a potential wastewater management implementation agency.

Considerations Specific to the Engineering Plan.

Certain features of the engineering wastewater management plans have an important impact on both formulation and evaluation of alternative institutional plans. The recommended plan for wastewater management to meet 1983 standards is Plan A. The most important feature of the recommended

engineering plan for its impact on institutional alternatives is that two separate systems are recommended to serve the urban planning area.

The second important feature is that one of the two systems serves an area with a large degree of sewerage development while the other system serves an area with essentially no present sewerage development.

The separate system serving the City of Spokane and North Spokane includes service areas of both the city and the county. County area in turn includes an irrigation district which provides some minor sewerage service. Also important to this system is the fact that the North Spokane area includes incorporated land not tributary to the city sewerage treatment plant but served by separate interim treatment facilities. Water service in the City-North Spokane service area is provided by the city, private utilities and irrigation districts.

The Spokane Valley subsystem is entirely within unincorporated areas except for the Town of Millwood. Water service in the Spokane Valley is provided by numerous water districts, irrigation districts, and private utilities.

The immediately following discussion of institutional alternatives is directed specifically to the recommended plan. The institutional implications of other wastewater management plans is discussed in a subsequent paragraph.

Candidate Alternative Plans

The field of alternative agencies after initial screening consists of:

1. Metro
2. County
3. City
4. Sewerage District

In addition, these agencies may be combined through inter-local cooperation contracts.

The engineering plan which recommends two separate systems suggests the alternatives of either separate institutional arrangements for each or a single institutional arrangement for both. A matrix of possible

institutional arrangements is shown in Table 3. Consideration of the limitation of the agencies acting alone eliminates many alternatives from the matrix as shown in Table 4. The remaining alternatives are considered further below, including the role of existing agencies.

## Consideration of One Agency for the Entire Urban Planning Area

Because the selected engineering plan results in two separate sewerage systems, and because these two systems are at much different levels of development, there is little need for one agency to administer and operate both of these systems at least at the initial phases of the program. Being separated, the systems can operate independently of one another. Similarly, each system will have its own expenses, and the agency or agencies operating the system will be more capable of developing a system's budget than a regional organization. Physical separation also diminishes the need to standardize materials and construction methods. Less standardization provides the flexibility sometimes required to solve technical problems which individual projects may face.

Despite the physical separation of the systems, a regional sewerage organization can handle several functions more effectively than the individual agencies. Until projects receive state and federal approval there will be a need to coordinate planning for the various projects.

Future changes in administrative guidelines or other unforeseen circumstances may result in an entirely different wastewater management program. Adjustments to any such changes would be easier if a regional agency is coordinating facilities planning. There will also be a continuing need to work with higher levels of government, such as the federal Environmental Protection Agency. A regional entity could handle routine matters with state and federal agencies and refer them to the local agencies when appropriate. Similarly, the regional agency could act as an information clearinghouse, keeping local agencies abreast of each other's activities and funneling state and federal information to individual agencies.

The main issue to be decided is whether, at present, there is sufficient need or advantage to have a single regional agency for the entire urban planning area rather than consider the optimum arrangement for each subsystem separately. Some of the problems of forming a metro for this particular area have already been mentioned. One of the most important considerations has not yet been mentioned which is the time and costs required to establish a regional sewerage organization. These potentially critical disadvantages must be weighed against the benefits derived from the organization. For example, even if a particular type of regional sewerage organization fulfills an additional need, it may require a long and complex formation procedure. This could offset any benefits by delaying projects and consequently increasing construction costs.

## Consideration of Cooperative Arrangements between Existing Entities

The Spokane urban planning area has a number of governmental entities with some level of sewerage powers including two cities, ten irrigation districts, four water districts, one sewer district and several county improvement districts. Except for the City of Spokane, none of these entities are presently capable of providing the proposed level of sewerage service to more than just a local area. Large portions of the urban planning area are not yet served by any agency with sewerage powers.

As shown in Table 4 and the above discussions, the required capability for serving both subsystem areas can be developed through cooperative arrangements between existing agencies, either:

City - County

City - Sewerage District

City - County - Sewerage District

There are advantages to involving both the County and Sewerage Districts, the former to provide coordination in dealing with the City and the latter to operate collection systems and provide local control. It is not necessary to involve the city in the arrangements for the Spokane Valley subsystem since neither city areas nor city facilities are involved. With the county involved in both, the county is in a position to provide an area planning input that would yield some of the same advantages as a single regional agency.

A plan based on the above is described below and shown schematically in Table 5.

1. For the subsystem serving the city and North Spokane:

   a. The City of Spokane would continue to operate its own sewerage facilities, including the treatment plant, the collection system and customer services inside city limits.

   b. In areas outside the city, the county would serve as the master sewerage agency, would construct and operate conveyance facilities, and would contract with the City of Spokane for treatment services and for joint operation and construction of certain mutually used conveyance facilities.

   c. Local improvement districts (sewerage) would be formed in county areas to construct and maintain collection systems.

   d. The county, after adoption of the sewerage general plan, would serve as the sewerage program management agency in areas outside the city.

   e. In the event that an area provided sewerage service by the county is annexed to the City of Spokane, then the sewerage functions would transfer to the city in accordance with RCW 36.94.180.

2. For the Spokane Valley subsystem:

a. The county would construct and operate the treatment facilities, disposal facilities, and trunk sewers.

b. Local improvement districts would be formed to construct and maintain collection systems.

c. In areas where local agencies provide some level of sewerage service, such as the Town of Millwood, the county would obtain written approval to manage the regional sewerage program.

Selection of an Institutional Plan

The plan described above and shown in Table 5 is based on a cooperative arrangement between City of Spokane and Spokane County for the City-North Spokane subsystem and for a County arrangement in the Spokane Valley subsystem. This plan has the advantages of easier implementation and political acceptance that recommend it over a regional agency. The remaining factors to be considered are the financing powers and resources.

As described in Section 801.2, financing powers and resources are very broad for three types of agency: cities, counties and metropolitan municipal cooperations. The selection of any of these agency types for a role in regional sewerage administration insures that the regional sewerage agency has the necessary broad financing powers and resources.

In addition, common financing powers may be coordinated through inter-local cooperative agreements. Therefore, the recommended institutional plan also meets the financing requirements of a regional sewerage program.

Institutional Requirements for Other Structural Alternatives

The foregoing recommendation is specifically applicable to Plan A, the recommended structural plan. Other structural plans that are considered in final evaluation include Plans B, C, D, E, F, G and H.

Plan D is the recommended plan for upgrade of Plan A to meet interpreted 1985 standards. Plan D is compatible with Plan A and requires no different institutional considerations. City-County cooperation for the City-North Spokane subsystem and County for the Spokane Valley subsystem are equally appropriate for Plan D as for Plan A. Plans E and F are similar in their institutional requirements to Plans A and D since they also combine the City and North Spokane in one subsystem and the Spokane Valley in a separate subsystem.

Plans B and H which provide for separate subsystems for the City, North Spokane and Spokane Valley have the simplest institutional requirements in that each subsystem can utilize the existing agency in which they are located except that for North Spokane subsystem, City-County cooperation is still required if the entire North Spokane service area is handled as a unit. If either of these plans were considered, it is likely that the City areas of North Spokane would be separated from the North Spokane service area functionally by pumping these areas to the City system, thus making it possible to have City and County areas separated with no need for cooperative arrangements.

Plan G which provides for combining the North Spokane and Spokane Valley service areas into a subsystem with the City separate is similar in its institutional requirements to Plans B and H as described above, with the same possibility of the City elements of North Spokane being functionally separated.

Plan C which combines all service areas together in one treatment and disposal system could be implemented by a City-County cooperation or a metro. A City-County cooperation has been recommended over a metro for reason cited above. In this case, however, the very reason for consideration of Plan C could be an expression of local opinion that both a single regional system operated by a single regional agency are worth the additional cost and effort required.

The unique condition of the Spokane Metropolitan Region with the City and County being practically the only existing entities with wastewater management needs and capabilities points to their involvement in practically any plan either singly or in cooperation with each other. Even the potential of incorporation of West Plains areas in an urban wastewater plan could not alter this condition significantly.

TABLE 1
EXISTING AGENCIES WITH WASTEWATER MANAGEMENT AUTHORITY IN THE URBAN PLANNING AREA

| Agencies | Population | Sub-Area Designation |
|---|---|---|
| City of Spokane | 173,000 | City S.A. |
| Town of Millwood | 1,800 | SV 2 |
| Vera Irrigation District #15 | 11,000 | SV 3-5 |
| Consol. Irrigation District #19 | 5,700 | SV 5-9 |
| Model Irrigation District #18 | 4,300 | SV 3,4 |
| Orchard Ave. Irrigation District #6 | 3,500 | SV 2 |
| Trentwood Irrigation District #3 | 3,400 | SV 9,10 |
| Hutchison Irrigation District #16 | 2,100 | SV 3 |
| Pasadena Park Irrigation District #17 | 2,000 | SV 1 |
| North Spokane Irrigation District #18 | 1,900 | NS 4 |
| Carnhope Irrigation District #7 | 1,400 | SV 3 |
| MOAB Irrigation District #20 | 170 | SV 8 |
| Whitworth Water District #2 | 8,900 | NS 3,5 |
| East Spokane Water District #1 | 3,200 | SV 3 |
| Irvin Water District #6 | 1,700 | SV 2 |
| Colbert Water District #9 | 500 | NS 9 |
| Liberty Lake Sewer District #1 | 900 | SV 7 |
| Spokane County (small sewered areas) | 300 | Various |

TABLE 2
SUMMARY OF EXISTING SEWERAGE FUNCTIONS IN THE
URBAN PLANNING AREA

| Entity | Wastewater Functions | Facilities |
|---|---|---|
| City of Spokane | Collection, treatment, disposal | 40 mgd treatment plant[1], interceptors to 72" |
| Town of Millwood | Partial collection, treatment | Small treatment facility serving 90 connections |
| Vera Irrigation District #15 | Partial collection, treatment | 3 separate treatment facilities serving about 100 connections |
| Consol. Irrigation District #19 | None | None |
| Model Irrigation District #18 | None | None |
| Orchard Ave. Irrigation District #6 | None | None |
| Trentwood Irrigation District #3 | None | None |
| Hutchison Irrigation District #16 | None | None |
| Pasadena Park Irrigation District #17 | None | None |
| North Spokane Irrigation District #18 | None | None |
| Carnhope Irrigation District #7 | None | None |
| MOAB Irrigation District #20 | None | None |
| Whitworth Water District #2 | Collection, treatment | Fairwood treatment facility serving about 1,050 connections |
| East Spokane Water District #1 | None | None |
| Irvin Water District #6 | None | None |
| Colbert Water District #9 | None | None |
| Liberty Lake Sewer District | Collection, treatment | Liberty Lake utilities treatment facilities serving about 100 connections |
| Spokane County (small sewered areas) | Collection, treatment | 3 separate treatment facilities serving about 300 homes |

1 - Treatment plant improvements to provide secondary treatment are under construction.

TABLE 3
MATRIX OF POSSIBLE
INSTITUTIONAL ARRANGEMENTS

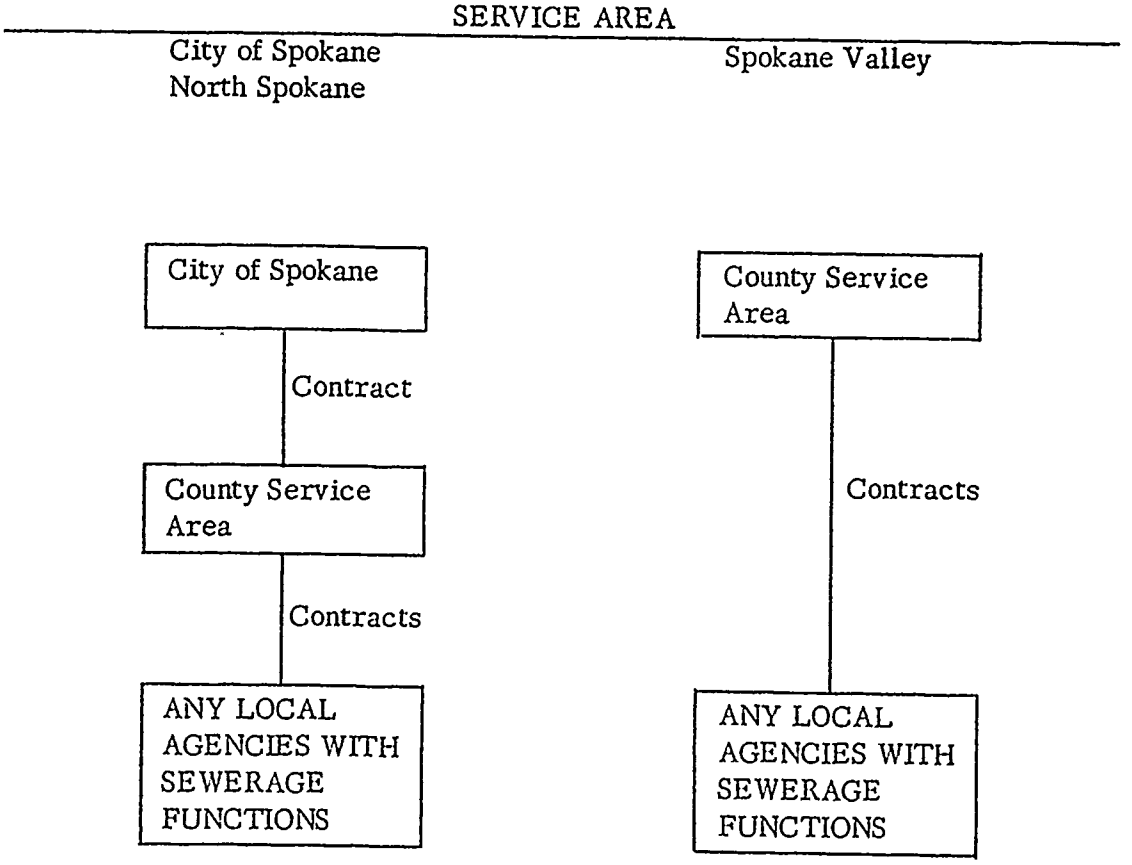
| Institutional Agency or Combination | Areas To Be Administered: City Plans North Spokane Alone | Areas To Be Administered: Spokane Valley Alone | Areas To Be Administered: Entire Urban Planning Area |
|---|---|---|---|
| Metro[5] | $X^1_2$ | $X^1_3$ | |
| County, Alone | $X^2$ | | $X^2$ |
| City, Alone | $X^4$ | $X^4_3$ | $X^4$ |
| Sewerage District, Alone | $X^2$ | | $X^2$ |
| City-County Coop<br>Sewer District-City Coop<br>City-County-Local Agency Coop | $X^6$ | $X^6$ | $X^6$ |

1- Not possible since the area served contains only one city.
2- Cannot operate in incorporated areas without contract.
3- Could cover all except Millwood.
4- Cannot operate outside the City without contract.
5- Metro, by law, is not alone. It is in cooperation with all.
6- Sewer District cannot use Inter-Local Cooperation Act.

TABLE 4
SELECTION CONSIDERATIONS OF CANDIDATE AGENCIES

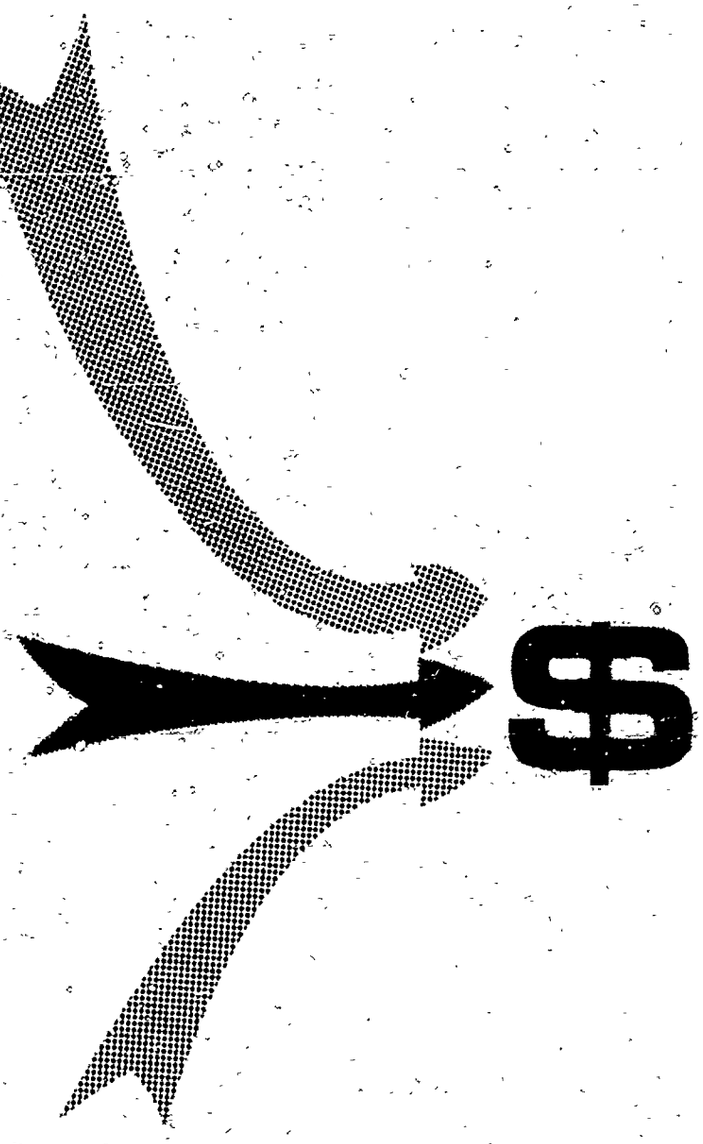
| Selection Considerations | AGENCY FORM | | | | |
|---|---|---|---|---|---|
| | Metropolitan Municipal Corporation | County | City | Sewer/Water District | Inter-Local Cooperation Arrangement |
| Formation Procedure | Requires Popular Vote And Board Resolutions | Requires Adopted Sewerage Plan | Not Practical Over Entire Urban Area | Requires Dissolution Of Existing Water/ Sewer Districts | Board Agreements, Contract Document |
| Local Representation | Representatives Of Local Agencies | County Board Of Commissioners | None Outside City | One District To Operate | Representatives Of Local Agencies |
| Financing Powers | Broad Powers | Broad Powers | Broad Powers Inside Boundaries | Broad Powers Inside Boundaries | Powers of Member Agencies |
| Financing Resources | Broad Resources | Broad Outside City | Limited To City | Limited To District | May Not Issue Bonds On Its Own |
| Area Management Responsibility | Must Include Entire Urban Planning Area | Can't Include Incorporated Areas | Usually Corporate Limits Only | District Limits Only | Area Of The Parties To The Agreement |
| Political Practicability | Difficult; Requires Highest Degree Of Cooperation | Not Practical For Spokane | Not Practical Outside Spokane | Requires Dissolution Of Existing Districts | Fewest Political Problems |
| Inter-Local Cooperation | Very Flexible | Must Contract To Serve Cities | May Contract With County | No Provision For Use Of Inter-Local Cooperation Act | Depends On Contract |

TABLE 5
INSTITUTIONAL CONFIGURATION




Sewerage Functions

| | | |
|---|---|---|
| Lead Planning Agency | City of Spokane | Spokane County |
| Treatment & Disposal | City of Spokane | Spokane County |
| Interceptor System O & M | City of Spokane, Spokane Co. | Spokane County |
| Collection System O & M | City, County, Local Agencies | County, Local Agencies |
| Customer Contact | City, County, Local Agencies | County, Local Agencies |



# SECTION 301.4

## FORMULATION AND EVALUATION OF ALTERNATIVE FINANCIAL PLANS FOR WASTEWATER MANAGEMENT IN THE URBAN PLANNING AREA

WATER RESOURCES STUDY

METROPOLITAN SPOKANE REGION

SECTION 801.4

# FORMULATION AND EVALUATION OF ALTERNATIVE FINANCIAL PLANS

Prepared by Bartle Wells Associates in
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20 October 1975

Department of the Army, Seattle District
Corps of Engineers
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## Objectives

The primary objective of this section is the development of financial plans for implementation of a selected wastewater management alternative for the urban planning area. The primary selected plan, Plan A, consists of two physically separated self-contained subsystems. The institutional plans developed in the previous section provide for institutionally separate arrangements for the two subsystems, having in common only the fact that Spokane County is an agency participating in both. The financial plan developed for Plan A must recognize the separate subsystems and the institutional arrangements proposed to serve them.

The basic financial plan is to be developed to support forecast capital and operating costs for facilities meeting the 1983 standards of PL92-500. In addition, the financial impact and general financial feasibility of possible future upgrading to meet interpreted 1985 standards is addressed.

The developed financial plan is to recognize current policies with regard to federal and state grant eligibility and is to propose methods of financing that would meet eligibility requirements.

Given the initial and staged capital requirements and the annual operation and maintenance costs for the engineering plans for wastewater management, the goals of this section are to formulate suitable financial plans to meet these forecast cost obligations. A financial plan is composed of the following elements:

1. A determination of the net capital funds which must be obtained locally after deducting the estimated amounts available from grant sources from the gross project cost.

2. A time schedule of net funding needs for capital improvements.

3. A plan for raising the funds for capital improvements and repaying borrowed funds from the financial resources of the service area.

4. A plan for maintaining the capital investment of the system.

5. A plan for continuously supplying the funds to meet operation and maintenance costs.

6. A plan for recognizing the value of existing physical plant that is to become a part of the wastewater management plan including integration of existing financial obligations into the new plan.

7. A plan for equitably allocating all costs among those benefiting from the wastewater management plan.

It is also a function of financial planning to evaluate the existing and forecast financial resources of the service area and to test the financial requirements of the proposed plan against these resources for feasibility.

There are a number of alternative methods for raising the required funds. It is an objective of this study to consider these alternatives, determine their compatibility with the institutional constraints and formulate an integrated financing plan. The plan for revenue development must also be tested for conformance with the requirements of the agencies administering state and federal grant programs that are to be utilized.

## Existing Sewerage Facilities

City and North Spokane Service Areas - Within both the City and North Spokane service areas there are existing sewerage facilities. Practically all of these existing facilities except interim treatment facilities will become useful elements in the primary selected plan. These existing facilities include the following:

### City Service Area

(1) The sewerage collection system serving approximately 170,000 persons. The collection system contains a number of pump stations.

(2) A sewage treatment plant currently in the process of upgrading and expansion to 40 mgd.

North Spokane Service Area

(1) Sewage collection systems in the city areas.

(2) Interim treatment facilities serving collection systems in city areas.

(3) Sewage collection systems in county areas.

(4) Interim treatment facilities serving collection systems in county areas.

The historical cost of the city facilities both inside the city service area and inside the North Spokane service area are shown in Tables 1 and 2. The only city facility in the North Spokane service area for which there is a historical cost is the Cozza-Calkins lagoon and the sewer outfall to it. All other sewers and interim facilities in the within city limits in the North Spokane service area were built by developers and dedicated to the city. All of the interim treatment facilities will eventually be phased out of service under the recommended plan, some at the initial implementation and some on a stage basis. Refer to Section 704.1 for details of stage construction.

The county has no historical cost for existing sewerage facilities in the county areas, all having been built by developers. As for existing facilities in city areas, some interim treatment facilities will be phased out at initial implementation and others at a later stage.

Spokane Valley Subsystem - The only existing sewerage facilities in the Spokane Valley Subsystem are very small collection systems served by interim facilities. A collection system and treatment facility serves the commercial area of the Town of Millwood. The Vera Irrigation District #15 operates three small developer-built systems. A few other developer-built interim treatment facilities and a number of small developer-owned systems operate in the subarea. The extent to which these very small systems can be integrated into the community collection systems is unknown.

At some time after 1995 it would be feasible to connect the Liberty Lake area to the stage construction of the Spokane Valley Trunk System. Due to the remoteness in time and the uncertainties of the need to connect, the financial plan does not include Liberty Lake. The forecast Liberty Lake service population is only 2 percent of the total forecast Spokane Valley service population so the omission or inclusion of this element will make no difference to the financial plan. The recently formed Liberty Lake Sewer District #1 has recently passed a $1,700,000 bond issue which is proposed for construction of facilities providing collection, conveyance, treatment and disposal to the Spokane River. Presumably, these facilities would operate to 1995 or after.

## The Primary Selected Plans

General - The plan selected for formulation of a financial plan is wastewater alternative Plan A. Plan A consists of two separate subsystems. One subsystem serves the City of Spokane and North Spokane with treatment at the City STP, the other subsystem serves Spokane Valley with treatment at a separate plant located near Felts Field. Both treatment plants are to provide secondary treatment to 1983 standards plus year around phosphorous removal for disposal to the Spokane River.

Subsystem for City and North Spokane - The subsystem serving the City and North Spokane utilizes the committed expansion and upgrading of the City STP.

No significant additional capital expenditure for treatment facilities for this subsystem is required except minor contingency items. See Section 704.1

The other elements of the subsystem serving the City and North Spokane under Plan A are as follows:

1. Conveyance Facilities for North Spokane Service Area.

   a. Initial construction to implement plan.

   b. Staged construction to increase the service population.

In addition to the above elements which are unique to Plan A, there are the following internal sewerage elements which are common to all plan alternatives and which must be recognized in the total financial response of the communities:

1. Collection systems, City Service Area.

   a. The existing collection system.

   b. Expansions to the existing system to serve growth during the planning period.

   c. Rehabilitation of the existing system to solve the problems of combined sewer overflow and local flooding.

2. Collection systems, North Spokane Service Area.

   a. Existing city systems tributary to interim facilities.

   b. Existing county area systems tributary to interim facilities.

   c. New systems to be built in city areas to serve existing structures presently served by on-site disposal facilities.

   d. New systems to be built in county areas to serve existing structures presently served by on-site disposal facilities.

e. New systems to be built in city areas to serve growth during the planning period.

f. New systems to be built in county areas to serve growth during the planning period.

3. Existing Interim Facilities, North Spokane Service Area

Refer to Figure A.

a. Serving City Areas

(1) Cozza-Calkins (Lidgerwood)

(2) Panorama Terrace

(3) Northwest Terrace

(4) Sundance Hills

(5) Pacific Park

b. Serving County Areas

(1) Fairwood

(2) Whitworth College

(3) Camelot-Carriage Hills

Of the above enumerated interim facilities the following will be phased out of service with the initial stage of plan implementation in 1980 whereas the remainder will continue in service to later stages.

(1) Cozza-Calkins

(2) Panorama Terrace

(3) Fairwood

(4) Whitworth College

Subsystem for Spokane Valley - There are essentially no existing facilities that become elements of a permanent system for the Spokane Valley. The required elements of the subsystem as defined in Plan A are as follows:

1. Treatment facility to provide secondary treatment and full-time phosphorous removal complete with solids processing consisting of anaerobic digestion, vacuum filtration and sanitary landfill.

2. An outfall sewer from the treatment plan site to a location approximately 11,000 feet downstream.

3. A sanitary sewage collection system.

In addition, the internal sewerage for the entire service area is an element of the total cost to the community. There are essentially no existing collection systems in the Spokane Valley:

a. To connect existing structures at the time of implementation which are presently served by on-site disposal.

b. To serve structures added after initial implementation throughout the planning period.

## Separate Financing Plans Required

Separate financial plans are required for the two subsystems which make up the primary selected plan, Plan A. The two subsystems are not mutually dependent. The two subsystems probably will not be implemented at the same time.

## Forecast Subsystem Costs

Forecast capital costs for the subsystem elements described above are shown in Tables 3 through 6 expressed in dollars at the price level of mid-1974 corresponding to an ENR-index of 2000. For details in the development of these costs refer to Section 704.1.

Capital costs are in terms of project cost which is equal to 1.4 times the construction costs for facilities and 1.25 times acquisition costs for land. These factors are applied to cover owners costs in addition to basic acquisition. For development of these factors see Section 401.1. Capital costs are given for the year in which the facility is expected to go into service. For purposes of financing, safeguards costs are escalated to the price level at the time of implementation.

Operation and maintenance costs are mean annual costs for these functions including long-term maintenance items which actually occur in an irregular manner. These costs are out-of-pocket expenses and do not include any allowance for capital recovery.

## Cost Escalation

The basic forecast cost data for each subsystem as described above are in dollars at a fixed price level. It is necessary to estimate future price level trends to convert these costs to dollars at future dates for financial plan formulation. The price escalation trends of capital costs and operation and maintenance costs are considered separately.

The National Consumers Price Index (CPI) is selected as representative of the kind of costs included in operation and maintenance expenditures. Table 7 shows the historical trend in the CPI for the ten year period prior to 1974. This data indicates that the National Consumer Price Index has grown at a compounding rate of 4.7 percent per year. Over the past two years the CPI has increased at a compound rate of 8.6 percent. This recent higher rate is especially due to the very high inflation rate in 1974 of 11.0 percent. According to recent federal government predictions, the Consumer Price Index will increase by about 9 percent in 1975 and by about 7 percent in 1976, after which time it will diminish to more historic levels. For purposes of this study, an inflation rate of 9 percent in 1975, 7 percent in 1976, and a constant annual rate of 6 percent thereafter will be used to escalate operation and maintenance cost estimates. If the actual inflation rate is above or below this estimate, then projected operation and maintenance costs will be above or below those shown. Table 8 shows the operating cost escalation index used to project future operation and maintenance costs in current year dollars.

The historical trends of price level for capital improvements in the wastewater management area are exemplified by the indices inaugurated by the Federal Water Pollution Control Administration which are identified below as (WPC-STP) and (WPC-S). Historical values for these indices and the Engineering-News Record (ENR) index are shown in Section 401.1. These indices show average compound increases as follows for the ten years 1964-1974 for Seattle:

| | |
|---|---|
| WPC-STP (Treatment Plants) | 5.6 percent per year |
| WPC-S (Sewers) | 5.2 percent per year |
| ENR | 6.7 percent per year |

Recent trends have jumped to in excess of 10 percent per year. It is not anticipated that the recent trends will be permitted to continue indefinitely and that there will, in the long run, be a return to levels closer to long-term historical. Estimates of 10 percent for 1974-75 followed by long-term mean of 7.5 percent per year are used for this study. Table 9 shows capital cost index to compute current year dollar values through the year 2000.

## Forecast Service Population

A forecast service population is used as the basis for the engineering forecast of needed facilities and the cost of operation. This same

service population forecast may or may not be used to forecast the revenue resources for financial planning. A safety factor for financial feasibility is sometimes introduced by selecting a smaller rate of service population growth for financial planning than was used in the engineering estimates. This financial plan study uses the same service population forecasts as for engineering and cost purposes. Recognition is given to the sensitivity of revenue to population forecasts in discussion.

For financial planning it is more convenient to express the service population in terms of equivalent dwelling units (EDU) rather than individuals. This unit represents one sewerage customer, either domestic or commercial, and is defined as a sewer user which generates the same volume of sewage that one family unit would generate. Thus, all single-family residences would count as one EDU, whether in multiple configuration, mobile home, or detached single-family residence.

A commercial customer would be some multiple of EDU (not less than 1.0), based on the average sewage generated or some other measure such as plumbing fixture units. For example, a gas station which generates double the average home's flow per day of domestic strength sewage would be two EDU's and would be charged twice the rate of a single-family dwelling. All commercial customers which discharge above average strength sewage would be rated at a higher EDU level to cover the costs of additional required treatment. It is not within the scope of a planning study to develop the total EDU on such a detailed basis. For planning

purposes, the total EDU's are estimated on the basis of 3.0 persons per EDU for residential users plus an additional 15 percent to account for commercial industrial and other non-residential customers. Experience has shown that 15 to 20 percent more EDU's become available to share the system expense than the number computed for residential customers. Conservatively, the lower end of the range is selected so that computed costs per EDU will be realistic but not understated. The forecast service population and equivalent EDU's for each subsystem are shown in Tables 10 and 11.

Existing Debt for Sewerage Facilities

As indicated under the description of existing sewerage facilities, only the City of Spokane and the Town of Millwood have made public agency expenditures for sewerage facilities in the urban planning area. The community of Liberty Lake is currently making plans for sewerage facilities.

Only one bond issue for sewerage is outstanding in the entire urban planning area. Table 12 shows that the City of Spokane has one bond issue outstanding in the amount of $348,000. The city's current sewerage improvements, resulting in a local share cost of about $4,700,000, are being financed entirely from reserve funds on hand.

Assessed Valuation

Although there are no agencies which are currently relying on ad valorem taxes to finance sewerage functions, levels of assessed valuation should be considered in any financing program for new regional

sewerage facilities. Also, historical information on assessed valuations is useful in estimating growth.

Table 13 shows the growth in assessed values for both the City of Spokane and Spokane County from 1965 to 1974. Since 1965 the assessed value in the City of Spokane has grown by an average compound amount of about 4.5 percent. The similar figure for property for the entire county is 6.5 percent.

The specific assessed valuations for the North Spokane and Spokane Valley service areas as of 1974 have been made available by the county through selective computer runs from their rolls. The results are shown in Table 14.

The computer runs show 6,256 parcels in North Spokane and 21,801 parcels in Spokane Valley giving average assessed valuations per parcel of $23,300 and $18,200 respectively.

## Forecast Funding Requirments

General - This financial plan requires that project costs forecasts be expressed in terms of current year dollars. Current year dollars are based on the capital and operating cost estimates shown on Tables 3 through 6 and are escalated by the appropriate index developed on Tables 8 and 9.

City and North Spokane Subsystem Project Costs - Table 15 shows the escalated capital cost for regional use facilities in the service area. Included as regional use facilities are the following: conveyance facilities, treatment and disposal facilities, force mains, trunks and interceptors 12 inches and larger in diameter, and pump stations.

Table 16 shows the escalated capital cost for local benefit facilities in the subsystem. Escalated operation and maintenance costs for the subsystem are shown on Table 17.

Spokane Valley Subsystem Project Costs - The escalated capital costs for regional use facilities and local benefit facilities for the Spokane Valley Subsystem are shown on Tables 18 and 19. The escalated operation and maintenance cost for the subsystem is shown on Table 20.

## Alternative Financing Methods

General - The available methods for meeting project funding needs not covered by grants fall into the two categories: (1) pay-as-you-go cash basis and (2) long-term debt financing. The financing program can use elements of either or both but, in the long run, whichever elements are used the funds must be produced by an adequate revenue program. The same elements that provide the alternatives to pay-as-you-go financing also constitute the alternative for a revenue program:

1. User charges

   a. Residential-Commercial

   b. Industrial

2. Connection charges

3. Taxes

The alternatives under long-term debt financing include:

1. General Obligation Bonds

2. Revenue Bonds

3. Assessment Bonds

The advantages and disadvantages of these alternatives are explored below.

Pay-As-You-Go Cash Basis - This method involves the accumulation of funds from current sources to fund future projects. The principal advantage of this method is that projects can be funded with a minimum outlay of funds. By comparison, long-term debt financing methods require the payment of substantial interest costs over the debt amortization period.

The disadvantages of this method are that it often is not possible to meet the capital funding requirements to implement the project in a timely manner from pay-as-you-go sources. Another consideration relates to equity. Most sewerage projects include capacity to accomodate future users. Placing the burden of raising sufficient cash on present users

to implement the proposed projects as scheduled, without immediate contributions from future users, is an inequitable burden on the present users. For a sewerage program of the magnitude of this one pay-as-you-go financing could only serve as a supplement to reduce the amount of long-term debt.

Discussion of fund sources available to pay-as-you-go financing is covered below under revenue program.

Long-Term Debt Financing - This method involves the issuance of long-term debt instruments which are amortized over a period of years. Funds to meet immediate costs are obtained as needed by borrowing and are repaid over an extended period during which the debt-financed facilities are used. Thus present users, as well as future users, pay for use of the facilities during the period of debt amortization.

This approach has several other practical advantages which may be summarized as follows:

1. In an expanding economy, even without inflation, per capita income is on the increase. Therefore, payment of a reasonable annual charge for the "rental" of a facility can be made easier over a period of years compared to the option of making full payment at the time of the acquisition.

2. The capacity of most communities to generate sufficient funds from current revenue for immediate construction is severely limited. If it is desirable to proceed with the timely building or acquisition of the facilities needed for the proper conduct of public business, it can be done conveniently with long-term debt financing.

3. Future users of a facility are obliged to make fair payment toward the provision of the facilities used.

4. In an economy which has throughout our history been marked by long-term inflation, the average dollars used to repay debt will be cheaper than those raised to meet funding requirements on a cash basis.

The principal disadvantage of long-term debt financing is that it is more costly. Over the period of debt amortization, substantial interest costs are incurred. Depending on the term of the debt and the interest rate paid to the lender, interest costs can nearly equal, or exceed, the principal amount of funds obtained.

The principal classes of long-term debt instruments used to finance projects which have community-wide benefit are: (1) general obligation bonds, and (2) revenue bonds. Special assessment bonds are used to finance facilities which provide immediate and localized benefits.

General Obligation Bonds - These debt instruments are secured by the full faith and credit of the issuing agency, and the issuer is obligated to levy or cause the levy of ad valorem (property) taxes to pay annual bond interest and principal, to the extent other funds are not available. Although this power and obligation to levy ad valorem taxes forms the underlying security for such bonds, no taxes need be levied if other revenues are sufficient to meet bond service. The issuer may use revenues from service charges or other sources to meet the required payments on the bonds.

Because the bonds are secured directly by an unlimited power to tax, they usually command about 0.5 percent lower interest rate than revenue bonds. Because of their security features, their tax exempt status, and their general acceptance by the bond market, general obligation bonds lend themselves readily to competitive public sale at the lowest interest cost available to the borrower.

With a revenue-supported general obligation bond, revenues from the enterprise are pledged toward payment of debt service. This limits the potential increase in the general tax rate. A self-supporting general obligation bond has the advantages of a revenue bond, but maintains the low interest rate and ready marketability of a general obligation bond secured by the taxing power of the issuing agency.

An authorized amount of general obligation bonds may be divided into one or more series and each series sold separately. Authorized but unissued bonds do not constitute an obligation of the issuer.

Under the present statutes, general obligation bonds of a constitutionally created entity (cities, counties) must receive an affirmative vote of three-fifths (60 percent) of those casting a vote on the measure to authorize the bonds. General obligation bond limits are set at 5 percent of the total assessed valuation of taxable property for counties. In the case of cities and towns providing for sewer service, an additional indebtedness of up to 5 percent of assessed valuation is allowed. This, therefore, allows a city or town up to a total of 10 percent indebtedness upon a three-fifths majority vote for sewer service. For a county, there is a statutory 8 percent maximum interest rate for general obligation bonds. For most other issuing agencies in the State of Washington there is currently no maximum statutory interest rate for general obligation bonds.

Revenue Bonds - The principal feature of revenue bonds is that they are secured solely by a pledge of the revenues from a facility or enterprise they are used to acquire, construct or improve. This type of bond may be issued to finance sewerage system improvements. A simple majority vote is required.

The issuing agency cannot levy taxes for the payment of revenue bond service. There is no legal limitation on the amount of authorized revenue bonds which may be issued, but from a practical standpoint the size

of the issue must be limited to an amount which will require annual interest and principal payments which are well within the facilities' revenues that are available for bond service. For most issuing agencies there is no statutory limit on the maximum interest rate for revenue bonds in Washington.

The actual interest rate bid on the bonds will depend on the degree of security provided and the current status of the bond market. Generally well secured revenue bonds may be expected to sell at an interest rate about one-half of one percent over general obligation bonds for the same purpose.

A measure of revenue bond security is the so-called "coverage" provided. Coverage is the ratio of net revenue to annual bond service requirements. For revenue bonds to be salable the issuer should pledge to maintain net revenue of from 1.25 to 1.50 times annual bond service. The degree of coverage which investors will expect to be pledged will vary with the type of facility to be financed and its historical earnings record. Furthermore, the marketability of the bonds will be enhanced if it can be shown that the actual coverage provided by the net revenues will exceed the pledged ratio.

A clear distinction should be drawn between pledging to maintain excess revenues (coverage) for bond service and actually using the revenues for that purpose. Except to the extent such revenues may be used to retire bonds ahead of maturity, all revenues pledged to the

payment of bonds, but not needed to meet bond service, may be used for any lawful purpose. Frequently these extra revenues are used for replacements and expansion.

An additional safeguard demanded by revenue bond buyers is the establishment of a reserve fund equal to average or maximum annual bond service. This reserve is usually created from the proceeds of the bond sale. It is maintained as a safeguard and is pledged to meet annual principal and interest requirements in case operating revenues are not sufficient for the purpose in any year.

The principal advantages of revenue bonds are that funds for payment of the bonds are derived from those who use the facilities for which the bonds were issued. As such, bonds are payable solely from revenues derived from the project and can never become a lien or charge against real property. An additional advantage lies in the fact that for an approved regional plan, governing boards of both city and county may authorize revenue bonds without an approving vote of the electorate.

Revenue bonds are not considered applicable debt toward an entity's general obligation bonding capacity. The issuance of revenue bonds to finance revenue-producing facilities preserves an entity's general obligation bonding capacity to meet its needs to finance non-revenue-producing facilities.

The disadvantages of this type of bond are that revenues to secure their payment must be from 25 to 50 percent above actual requirements;

however, in the case of grant-aided sewerage system revenue bonds this disadvantage is offset by the need to obtain sufficient funds to meet accruals for depreciation or in this case by the continued large capital improvement expenses.

Use of revenue bonds necessitates a larger bond issue, compared to a project financed with general obligation bonds, since a bond service reserve must be established and maintained over the life of the issue. This disadvantage is offset somewhat in that the reserve fund is used to make the last payment of debt service. In the intervening years, the reserve fund is invested and earnings may be used to help meet accrualfunding requirements.

Interest rates bid on revenue bonds tend to be higher since they are secured soley by the revenues of the project financed with the bonds, and not by the unlimited taxing power of the city as in the case of general obligation bonds. Finally, owners of property (undeveloped, or developed but not tied into the sewerage system) pay nothing to service the revenue bonds even though they derive benefits from the project. This latter disadvantage in the case of undeveloped property owners can be offset somewhat through establishment of appropriate connection charges based on demand placed on the system and the entity's investment in facilities to meet that demand.

Assessment Bonds - Assessment bond financing is a possible vehicle for a project of identifiable benefit. A utility local improvement district (LID) can be established and assessments spread for projects of special

local benefit. Assessments constitute a lien against the benefited property which serves as security for issuance of bonds to finance the project costs. These liens would not represent an encumbrance on any overlapping district and do not affect any district's debt capacity. The property securing the lien must, however, be of sufficient value to more than cover the assessment.

Assessments must be spread only over property that benefits from the project. Because unbuildable property receives no benefit, an engineering determination of buildable lots must be made in spreading assessments.

Assessment bonds have specific application to finance collection sewers, lateral sewers and trunk sewers where the benefits of the facilities can be easily identified.

## Revenue Programs, General

An entity's sewerage system revenue program must meet three basic tests. First, total annual revenues should exceed operating and bond service expenses. Second, revenue from industrial users should be obtained on the basis of their proportionate use of the system's facilities in accordance with Environmental Protection Agency guidelines published in the Federal Register, February 28, 1973. The third test relates to the principal that the sewerage system revenue program should generate funds to place the system on a self-supporting

and self-renewing basis, i.e., annual revenues, after meeting operating expenses, should equal or exceed annual depreciation of capital plant based on original cost and estimated useful life of the system. To meet this test, the combination of: (1) annual capital outlay, (2) debt principal payments, and (3) accruals to a capital reserve fund must equal or exceed annual depreciation of capital plant.

## Sewer User Service Charges

The sewer user service charge is the basic continuing revenue producer other than ad valorem taxes. The sewer service charge can be allocated in a variety of ways providing alternative methods of equitably spreading costs to those benefiting from the service. The ad valorem tax does not have this flexibility.

For residential sewer service charge some of the bases for cost allocation that have been considered include the following:

(1) Flat rate per dwelling unit

(2) In proportion to water consumption

(3) In proportion to the size of water meter

(4) In proportion to the number of bedrooms or baths

For commercial customers, the rate structure may include bases such as:

(1) Equivalent dwelling units

(2) In proportion to water consumption

(3) In proportion to water meter size

It is not within the scope of this study to devise detailed rate structures. The objective of this study is to determine the total share of financing to be produced from sewer service charges as compared with other sources. For the purpose of evaluating the impact on each customer, the estimated service charge is expressed in terms of the flat rate per dwelling unit (EDU). This is compatible with the present method of levying service charges in the City of Spokane.

The guidelines for industrial user charges are established by law for federally funded facilities. The guidelines consider parameters of flow, BOD and suspended solids and permit inclusion of other parameters. An industrial user charge study for the City of Spokane has been completed (Bovay, 1974). As for residential user charges, it is not within the scope of this study to develop the detail of possible future industrial users charge rate schedules for the city and other service areas. The objective in this study is to estimate the share of total user charge revenue that will be produced by industry, primarily for the purpose of evaluating the impact on the residential flat rate. This is done by assigning 15 percent additional EDU's to commercial and industrial customers.

## Connection Charges

Connection charges are lump sum payments made by a customer at the time his service begins. This type of charge produces a one-time source of revenue from each new customer. A connection charge is usually regarded as a payment by the new customer to purchase his share in the existing facilities previously paid for by the existing customers.

Two classes of connection charge are considered, one for customers existing at the time of implementation of a community sewerage plan and one for future customers. A connection charge for customers at the time of implementation is not used herein. The specific financing plans provide for either purchase of a share in existing facilities or equalization compensation for existing facilities as project cost elements. By not having a connection charge for initial customers, these costs are met in the computed service charge. This is regarded as a conservative approach and financial safeguard at this stage of planning.

The connection charge for future customers will depend upon the actual local investment (exclusive of grant financing) incurred by the existing customers, the price level at the time they were incurred and the price level at the time the connection charge is paid. The City of Spokane experience is selected as an example for the approximation of an appropriate level of service charge for the entire study area. From Table 1, the net local investment at completion of the expanded STP is found to be approximately $11,300,000 incurred over a period 1945 to 1975. This is

equal to approximately $200 for each of the less than 60,000 EDU's now served. Inflated from an average price level of 1965 to 1980, the value per EDU is $315.

## Ad Valorem Taxes

Taxes levied in proportion to the value of the property are a potential revenue source that can be used to pay for either bond amortization or recurring operation and maintenance costs. Due to the trend of commitment of taxes for other civic purposes up to the limit of the maximum statutory rate and because of the inequities inherent in the payments related to the services, this revenue source has not been favored recently for sewerage financing.

Taxes are not shown as a revenue source in this report because of the federal grant regulations preference for user charges as well as the local history of sewer user charges. Taxes may be used on voter approved general obligation bonds, but the expectation is that a good share of the long-term debt will be revenue bonds.

## Assessments

The bond service (principal and interest) on assessments is paid annually as an addition to the property owner's tax bill for convenience in collection but it is distinct from ad valorem taxes. It is the only revenue device to repay individual property assessments for local benefit facilities.

Federal and State Grants

Public Law 92-500, administered by the Environmental Protection Agency (EPA), provides a 3-step grant program for total development of "sewage treatment" facilities. The law has extended the definition of treatment facilities to include collection systems and storm drainage facilities. The administrative guidelines, however, discourage the eligibility of collection or storm drainage facilities except in unusual cases. PL 92-500 grant funds are available for facilities planning under Step I, for preparation of contract drawings and specifications under Step II, and for construction under Step III. Grants are available to 75% of project cost. The allocation of priorities and control of grant dispursement is by the State Department of Ecology (DOE), subject to concurrence by EPA.

Washington State offers companion grants of up to 15% which are administered by D.O.E. to the same eligibility requirements as PL 92-500. A state grant may not be offered without a committment of a federal grant.

While federal and state grant assistance is not assured throughout the project life, this study assumes that grants will continue to be available at the same level as at present.

One problem with the present grant program is that grant funds are forwarded at pre-arranged intervals (usually at certain percent completion points) and in arrears. The subareas should be prepared to finance a disproportionate share of the total project cost during initial construction to cover cash flow needs. At this time, it is difficult to say if the project will have a cash flow problem.

In the meantime, these partial remedies are available.

- Careful staging of the construction program, including postponement of local ineligible construction so that all available local funds can be used to meet the short-term cash flow problem.

- The subarea can use other available resources such as reserve funds.

- Sale of notes may be possible to provide short-term funds.

As a financing safeguard, assistance from other state and federal programs has not been included in this plan. Application for such funds would be made and pursued expeditiously wherever practical to assist in reducing local costs. The following summarizes the primary sources of Federal grant and loan funding available for sewerage programs, other than PL 92-500:

- E.D.A. Programs, U.S. Department of Commerce (The Public Works and Economic Development Act of 1965) - Certain designated economically depressed areas may obtain grants for public works projects for up to 80 percent of costs. In recent years applicability of E.D.A. grant programs for construction of sewerage works has been limited to those projects which could demonstrate a strong impact on economic growth. The program has further been limited in the amount of funds appropriated and distributed. E.D.A. funds are not normally made available to projects which are eligible for a significant amount of E.P.A. grant funding under PL 92-500.

- Basic Water and Sewer Facilities Grant Program, U.S. Department of Housing and Urban Development (The H.U.D. Act) - Grants for con-

struction of public works facilities in communities and metropolitan areas are available in amounts of up to 50 percent of land and construction costs. H.U.D. has not recently received significant appropriations to fund the water and sewer facilities program and it is unlikely that funds from this source would be available unless there is a future policy revision. H.U.D. funds would not be applicable to facilities eligible for E.P.A. funding and would be applicable to collection systems only, exclusive of lateral sewers.

- The "701" Program, U.S. Department of Housing and Urban Development - Provides funds for solving comprehensive planning problems. Grants of up to 66.7 percent of the cost of comprehensive planning programs, including wastewater management planning elements, are available. This program has functionally been superseded in the area of wastewater management planning by the provisions of PL 92-500, section 303e and 201 for basin planning and facilities planning.

- Public Facility Loan Program, U.S. Department of Housing and Urban Development - Loans provide up to 100 percent of project costs for sewerage facilities. This program is a companion program to the H.U.D. basic water and sewer facilities grant program applicable essentially to unusual conditions where conventional loan funding cannot be obtained.

- Farmers Home Administration, U.S. Department of Agriculture - Provides grants to rural areas of less than 4,000 population for comprehensive plans for sewer system development up to 50 percent of cost of sewer systems. This program also provides for loan funds to assist

in that portion of rural projects ineligible for F.H.A. or E.P.A. grant funding. Legislation and appropriations decisions may influence the availability of funding through the above programs.

## Formulation of the Financing Plan

General - The magnitude of the sewerage projects in both subareas necessitates the use of all types of financing available except ad valorem taxes. This plan allows for the use of revenue bonds, state and federal grants service charges, connection charges, some pay-as-you-go financing for sewer corrections and assessment bonds for local benefit facilities.

Regional Use Facilities - Regional use facilities include sewage treatment plant, disposal outfall, trunks and interceptors 12 inches and greater in diameter, force mains and pump stations. The total project cost of regional use facilities would be financed in the following manner:

All state and federal grants would be applied for, then the net local cost would be raised by sale of bonds. This report shows revenue

bond as the finance instrument as a financing safeguard. Wherever general obligation bonds are sold, the financing cost would be somewhat less than the estimated debt service assuming that interest rates remain somewhat near normal historical levels. Revenue bond interest rates for the City-North Spokane area are estimated at 6.75 percent which except for short-term times of high interest rates such as the present would likely be a conservative guess at the area's cost of borrowing. Revenue bond interest rates for the Spokane Valley are assumed slightly higher at 7.0 percent because there is no past history of sewerage revenue bonds for this area. Wherever the voters approve general obligation bonds for any of the projects, the interest rates would likely be about 0.5 percent below the corresponding rates for revenue bonds.

The bond principal amounts include provision for one year's debt service. Because of the extensive continued capital improvements in regional as well as local benefit improvements, the coverage of the bonds would require no extra revenues over the amounts needed to operate the system during the period of this study.

Local Benefit Facilities - Local benefit facilities would be financed entirely by the users receiving the benefit. In general the financing for local benefit facilities would be provided by some form of connection charge at the time of initial connection. Three methods of payment for local sewers are available.

(1) A local agency could finance and construct the facilities with whatever funds or reserves are available. As new users connect to the system they pay their share of the cost of the facilities as a connection charge based on some pre-determined basis similar say to assessment allocation of costs.

(2) Local sewers could be provided by a private developer and these facilities be turned over to a local agency to maintain and operate. The developer would pass on the cost of these facilities to sewer users in the form of a higher sales price of each home. The customers would benefit from this type of arrangement because the cost of these local benefit facilities would be spread over the life of a home mortgage and the financing costs of home mortgages is usually the best personal financing arrangement that most people can obtain.

(3) A Utility Local Improvement District could be formed and for a specific local benefit project cost allocation could be made to all property that directly benefits from the facilities. Usually an engineering determination of cost allocation is necessary to equitably spread the cost of the project. Assessment bond would be sold and the benefiting property would pay the annual bond service over the life of the issue. A problem sometimes occurs where much unimproved property is involved and where the value of this property is low in relation to the size of the assessments. This type

of situation often leads to a high percentage of defaults and thus weakens the bond sale and results in increased interest costs.

City and North Spokane Subsystem - Tables 21 and 22 show the summary of financing for the City and North Spokane Subsystem. Regional facilities are financed by state and federal grants to the maximum extent possible. The remaining local share is financed by the sale of bonds. The bonds are assumed to be revenue bonds as a financing safeguard since these are more expensive than general obligation bonds. General obligation bonds are the least expensive form of financing and are recommended if they are repaid from revenue. Whenever the voters approve general obligation bonds, the bond service cost will be somewhat reduced from that shown on the Table.

Local benefit facilities would be financed by charges from those receiving the benefit. Table 21 shows that the average cost of these facilities is over $1,000 in North Spokane per customer and slightly less than $1,500 per customer in the city.

Table 22 shows the proposed financing of sewer separations and connections in the City of Spokane. Assuming that this program is eligible for state and federal grants, the remaining local share could be financed by the sale of bonds. Whatever additional reserves or other surplus funds are available could also be applied to this program.

In any respect the project listed on Tables 21 and 22 are far too extensive to finance by any type of pay-as-you-go financing. Pay-as-you-go funds are not shown in this program and any that are available would serve as a financing safeguard to reduce the principal amount of bond sales.

The bonds could best be issued by the City of Spokane where only council action is required to authorize sewer revenue bonds. For any share of the proceeds of bonds used for residents outside the city a contract would be necessary to specify the terms of the financing.

Alternatively, the county area in North Spokane could also issue sewer bonds. The county could establish a sewer service area and if the voters in this area authorize bonds then these could be sold to finance the sewerage program. If facilities serving the residents of the city were constructed from the proceeds of these bonds then contracts would need to be arranged to specify the details of the arrangement.

Spokane Valley Subsystem - Table 23 shows the summary of financing for the Spokane Valley subsystem. The financing program is exactly similar to that for the City and North Spokane subsystems. For regional facilities, costs in excess of state and federal grants would be financed by the sale of bonds. Local benefit facilities would be financed by those who receive the benefit in the same manner as discussed previously. Local benefit facilities average $1,508 per customer based on 1974 dollars, considering the entire planning period.

## Capital Adequacy Test

As a consequence of the receipt of grants, federal agencies want assurance that adequate revenues are derived to maintain the investment in the physical system. For a program such as this one, the question of capital investment adequacy is understandably trivial since a local investment of over $95 million is planned for the City-North Spokane subsystem and about $150 million for the Spokane Valley subsystem up to the year 2000. However, to demonstrate the plan as well as provide future guidelines on capital improvement, a test developed in another state is included here. This test demonstrates the maintenance of the level of capital investment.

The test compares a guideline annual depreciation on certain facilities to the level of annual capital expenses into the system. The rational of the test is that the annual depreciation of the system should at least be offset by new improvements in the system. This is a form of pay-as-you-go plan to help maintain the system's integrity throughout its useful life.

The guideline annual depreciation is straight line, thirty-year life on treatment facilities and pump stations. For the test annual capital expenses are defined as;

(1) principal payments on debt or financing and,

(2) local share of capital improvements.

Table 24 shows the guideline depreciation for the City and North Spokane Subarea System. The annual depreciation in 1980 is $1,648,000. Additional depreciation is added as new improvements are made to the system. At the bottom of the Table, this annual depreciation is compared to capital expenses. Because the capital expenses greatly exceed the annual depreciation, there is no need to fund additional capital accruals. If, however, depreciation exceeded annual capital expenses then additional revenue would need be generated and placed in a capital reserve account. A similar calculation for the Spokane Valley Subsystem is shown in Table 25.

## Cost and Revenue Allocation Methods

The implementation of a complex public service facility involves a determination of how the users of that facility participate in its cost. The problem is further aggravated when the users are in different political units and there are existing facilities and debt that are proposed to be incorporated into a larger system.

In effect, one important decision of cost-sharing has already been made in the foregoing discussions by designation of certain facilities as "regional" and "local benefit." This division is widely accepted and is indirectly recognized in law by the definition of what capital expenditures can be financed by a local improvement district. The division at 12-inch sewer size is arbitrary but widely accepted.

The discussion below is directed at consideration of the alternatives for sharing the costs for the "regional" component. The discussion is

made even more specific by the nature of the two subsystems which make up the recommended plan for the urban planning area in this study. Only the City-North Spokane subsystem involves more than one existing political agency and involves the utilization of significant existing faciliites and debt.

The proposed wastewater plan will involve much greater capital and operating costs than in the past. The ability to support the local financial burden is one of the important problems to be considered in the present planning. The potential impact of cost-sharing methods on financial feasibility is another important reason for consideration of alternative methods. Four alternatives are considered below.

Assessed Valuation - A cost allocation method often used in public works financing is in proportion to assessed valuation. Such a procedure is commonly used when the facilities constructed are of common overall benefit to the area served. Internally this method of distribution is used now by most public agencies where a tax rate for sewerage is levied. However, federal grant regulations now prohibit property taxes as a source of revenue for operational expenses.

Payment in proportion to assessed valuation would not be capable of recognizing existing facilities and debt in different political units. For this reason and the general incompatibility of the method with federal grant regulations, this method is not considered further.

Independent Program Share - Capital cost distributions may be made in proportion to what an independent, go-it-alone program would cost for each agency. The agencies would pay as their share regional costs in proportion to the estimated costs of their respective go-it-alone programs. This method does not lend itself to a convenient comparable method of sharing operation and maintenance costs in proportion to hypothetic operation and maintenance costs of go-it-alone system. Operating costs would likely be based on annual volume of sewage from each agency.

Also, this method does not conveniently recognize existing facilities, facilities which meet either higher or lower standards than the hypothetical individual systems or the problem of future facilities upgrading. Further consideration of cost sharing based on ratios of independent programs is not recommended.

Capacity Cost Sharing - Cost shares may be allocated on the basis of capacity requirements by each element in each component of the system. The application of this method to facilities such as a treatment plant or outfall is clear, but various degrees of interpretation are possible when applied to major trunks, interceptors, and other conveyance facilities. In the latter case, this method, when carried to the extreme, would assign all of the cost to the uppermost entity for the uppermost section of sewer. Facilities further down the line would be shared by more and more users and the costs allocated among these users. A major drawback under such a procedure is that it penalizes areas which are located on the extremities of the system. Upstream users are sometimes subject to an impossible economic

burden only because of geography or an engineering decision of where to locate the treatment facilities. For this reason, when grant funds are involved, some states have formulated restrictions against the use of this type of arrangement. These restrictions require that all conveyance costs (interceptors) shall be considered a basic part of the regional facilities and shall be lumped together with treatment costs and apportioned in the same manner as are treatment costs.

To an increasing degree regional sewerage projects are made feasible by the large percentage of grant funds available. These grant funds enable several entities to work together to solve sewerage problems on a region-wide basis. An inherent feature of region-wide projects is the large portion of interceptor costs to the total project cost. The grant program effectively offsets most inequalities with respect to unfavorable location. Thus the disadvantage of high interceptor costs to one location is overshadowed to a major degree by the availability of a 90 percent total grant to regional projects.

On the other hand, interceptors can be said to directly benefit only that segment of the population which uses them. This is usually pointed out by the entity with a favorable location which has no economic incentive for a regional project since it must pay a share of the cost of interceptors which it does not need or use. This argument cannot overcome the fact that a regional facility is proposed because it is more cost effective than separate solutions and that it is in the general best interest to create regional facilities, in support of which grants are made.

Washington does not have a specific requirement that all facilities be lumped together with the treatment facility for capacity sharing on a regional basis. This permits formulation of an alternative that is between the extremes described above. As applied specifically to the City-North Spokane Subsystem, the capacity cost-sharing alternative developed herein for consideration makes the following assumptions:

1. Capacity rights in the City STP for the County residents of the North Spokane Services area are purchased from the City in proportion to the flow at design year.

2. The operation and maintenance costs of the City STP are shared by City and County residents in proportion to flow.

3. Capital costs of conveyance facilities from North Spokane to the City STP and of trunk sewers, pump stations and force mains in the North Spokane service area are shared only by the City and County residents of the North Spokane service area in proportion to their respective flows.

Equalized Cost Sharing - Every entity that levies a uniform charge throughout its service area uses this method. This method assumes that a desirable goal is a uniform charge for a uniform level of service throughout the area served. On a regional basis the use of this method is best justified if combined with a program of the regional agency to assume existing plant assets and liabilities. This plan would equalize the overall costs of service not only for present and future costs, but for past costs as well.

This method of cost allocation is the closest of any in meeting requirements of the federal grant regulations because it is based on equal cost for equal service throughout the service area. This method is demonstrated in this report and compared with the capacity share method as described above for the City-North Spokane Subsystem. There is no need to consider alternative cost-sharing methods for the Spokane Valley Subsystem since it is institutionally ideal for the equalized cost method and other systems are not relevant. Application to the Spokane Valley Subsystem is described subsequently.

## Revenue Program Based on Equalized Cost-Sharing Method

Compensation for Existing Facilities - As a basis for establishment of an equal charge system some compensation for existing major facilities that are made part of a regional sewerage system must be made. The engineering plan recommends utilization of existing facilities, particularly those of the City of Spokane. Compensation is due the owners for their equity and debt.

The compensation funds are normally used by the agency receiving payment, first to meet the outstanding debt and the remainder applied to other sewerage purposes such as repairs, reduction of service charges or accumulation as reserves. As applied herein, the compensation is applied toward debt and reduction of the local component of the service charge.

Title to existing local facilities need not change. The interagency agreement would, however, indicate which facilities are part of the total regional system.

The exact equalization payment due each entity would be based on a future precise audit of original costs. The local entities would work together to determine exactly which existing local major facilities would be included in the equalization program.

The equalization-compensation method is available only if the uniform charge approach is used to allocate regional costs. This is because only by collecting uniform area-wide charges can compensation amounts be obtained equally from each sewer user. Any other cost allocation system would only serve to create new inequalities.

Only major facilities are included in the equalization program. These facilities include the following:

- Trunks and interceptor sewers 12 inches and larger in diameter. Other smaller diameter major interceptors and some trunk sewers on an individual case by case basis.

- Force mains and pump stations (other than those which serve only to solve a local collection problem).

- Treatment plants.

- Outfall sewers.

- Land associated with facilities listed above.

Table 1 shows the original cost of major sewerage facilities for the City of Spokane. This Table includes investment in facilities which do not qualify as major facilities. In addition, some of the facilities (especially within the original treatment plant) may no longer have any useful life remaining. For purposes of this study, the compensation amount due for existing major facilities listed on Table 1 is as follows:

Interceptors - 25 percent of amount shown.

Treatment Plant - 10 percent of amount shown before 1973 and all costs from 1973.

Pump Stations - 25 percent of amount shown.

Grants - Exclude all grants before 1973 and include all grants from 1973 and after.

The foregoing reduction from book values should be recognized as highly tentative. A detailed study would be required before values could be brought up for consideration by the agencies involved to set contract amounts.

Table 2 shows a summary of the original cost of major facilities used in this study.

Table 26 shows the equalization and compensation plan for major sewerage facilities based on the above assumptions. These costs are subject to a future audit to determine the validity of the above assumption, the exact original costs, and the actual facilities which qualify as major regional facilities. The original cost of major facilities minus all grants received represents the net local investment in major facilities. The reimbursement is made in 25 equal principal installments plus five percent interest on the unpaid balance.

Table 26 shows that the entire amount of sewerage investment is by the City of Spokane in the City-North Spokane Subsystem. In the Spokane Valley Subsystem, the Town of Millwood shows a total sewerage investment of $59,000, including the cost of the collection system which does not qualify for equalization reimbursement. For purposes of cost analysis, this report assumes $10,000 as the original cost of the Millwood treatment system.

Revenues and Expenses-City and North Spokane Subsystem - Revenues and expenses are developed in Table 27 for the entire combined service area of the City and North Spokane, including both City and County subunits. The costs shown in Table 7 are for treatment and conveyance only and do not include any local benefit costs. The regional operation and maintenance costs are the sum of treatment and conveyance costs from Table 17. The bond service costs are from Table 21 and include costs associated with treatment, conveyance, and trunk sewers 12 inch and larger. The item identified as equalization compensation is based on the amount required to reimburse the net City investment in regional facilities of $5,313,000 over a period of twenty years with interest on the balance. The principal installments are $213,000 per year and the first year (1980) interest on the unamortized balance is $265,000 for a first-year total of $478,000.

As described above, a regional connection charge of $315 at 1980 price level is adopted for all future connections in the total City-North Spokane service area, regardless of location. All other revenue is made up to meet expenses from a uniform regional service charge. The principle of equalization method being equal charges for equal service, there is only one service charge applicable throughout the combined service area. This is computed as $4.40 per dwelling unit in 1980. If general obligation bonds are authorized, some of the revenues may be derived from property taxes. On a constant dollar (de-escalated) basis, the service charge actually decreases over the period of this study.

Revenues and Expenses-City of Spokane - Based on the regional revenues and expenses derived in Table 27, the revenues and expenses for a homeowner in the City of Spokane are developed in Table 28. In addition to the subarea-wide service charge of $4.40/month for treatment and disposal-related expenses, collecton system (internal) and customer service expenses must also be levied. The cost per homeowner starts at a total of $6.06 per month and increases to $17.70 per month in the year 2000, expressed in escalated dollars. Based on 1974 dollars, the charges per EDU are comparable to those of other communities which have upgraded their sewerage systems and actually show a decline over the years, beginning at $4.12 per month and ending at $3.75 per month in year 2000 for total regional and local costs.

The capital cost of providing local benefit sewers is shown but not included since it is a financing operation normally either paid directly at cost if provided by the City or as a donation if provided by a developer.

Revenues and Expenses-North Spokane - The expenses for North Spokane residents are developed in a similar manner as those for the City of Spokane. Table 29 shows that the total regional plus local service charge costs of the sewerage program for this subarea is slightly higher initially than for the city, due of course to the higher local cost since the regional charge is uniform. The total monthly service charge is within acceptable limits.

Revenue Program Based on Capacity Cost-Sharing Method

Allocation of System Capacity - The accepted method of allocating capacity shares in capital facilities of a system is on the design year use of the facilities. For example, the sewage treatment plan in Spokane is designed for a flow rate of 40 mgd. As shown on Table 30 the sewage flow in the year 2000 for the North Spokane area outside city limits will be 4.44 mgd. which equals 11.1 percent of the total. Therefore, North Spokane should pay 11.1 percent of the local capital cost of the treatment plant.

Allocation of capital costs for conveyance facilities is likewise based on the share of design year flow. Conveyance facilities, unlike the treatment plant, are used only by the North Spokane Service Area. The costs are therefore shared by the users within the North Spokane Service Area.

For all facilities, operation and maintenance costs are according to common practice allocated on the basis of the flow in each year as shown at five-year intervals in Table 30.

As may be seen from the above explanation much of the cost allocation is based on predicted sewage flows from each element using a facility. The extent to which an area grows faster or slower than forecast affects the degree of accuracy of actual cost sharing as compared with intent. Another problem with this method of cost allocation is that frequently one area exceeds its capacity before another area needs or is willing to invest in additional facilities and the cost-sharing situation must be reevaluated.

Table 30 develops the allocation percentages based on the above assumptions. Table 31 allocates the capital and operating expenses based on the percentages developed in Table 30. The County purchase of an 11.1 percent share of the City equity in the existing treatment plant is shown as a separate capital expense.

Revenues and Expenses-City of Spokane - The revenues and expenses for the capacity cost-sharing method for residents of the City of Spokane are shown on Table 32. Based on this method of cost sharing the monthly service charges are about four percent lower initially than for the equalization cost-sharing method. This is due to the cost of conveyance facilities financed through area-wide financing in the equalization method but assigned only to the North Spokane Service Area in the capacity share method.

Revenues and Expenses-North Spokane - Based on the capacity shares of costs shown on Table 31, the revenues and expenses for the North Spokane subarea are shown on Table 33. The monthly service charge for residents of the North Spokane area are initially about 50 percent higher than for the equalization cost-sharing method.

The monthly service charge of $6.46 in 1980 based on 1974 dollars is somewhat above the commonly acceptable level of charge for this service. It would be expected that a monthly charge of this amount would be carefully weighed by the public against the benefits of the project.

Evaluation of Alternative Methods for City-North Spokane Subsystem

The costs under the two alternatives for cost sharing in the City-North Spokane Subsyst' are summarized as follows for the year 1980:

| | Equalized Cost Method* | Capacity-Share Method* |
|---|---|---|
| City | | |
| Regional Service Charge | $4.40 | ) |
| Local Service Charge | 1.66 | ) $5.80 |
| Total Service Charge | $6.06 | $5.80 |
| County | | |
| Regional Service Charge | $4.40 | ) |
| Local Service Charge | 1.97 | $9.50 |
| Total Service Charge | $6.37 | $9.50 |

*Expressed in dollars at 1980 price level

Both of the foregoing methods of cost allocation have been utilized elsewhere and are regarded as equitable. In this particular case there are obvious advantages to the County areas to the equalization method which reduces the service charge by thirty-three percent. The offsetting cost to the City is an increase of four percent. The equalization method is in effect an approach to regionalization and is comparable to the rate structure that would likely evolve using a Metro, but without the delays and costs of forming a Metro. The equalization method is recommended for consideration by the

agencies involved. Resolution of this methodology is one of the first hurdles to forming the cooperative relationship between agencies necessary to the physical, institutional, and financial implementation of the recommended plan.

The Recommended Plan for City-North Spokane Subsystem

Under the recommended institutional plan, the City becomes the lead agency in owning and operating the treatment facility. Due to the physical location of much of the conveyance system within the City limits and the need to coordinate parts of it with needed sewer improvements, the City should also own and operate those conveyance facilities within the City. The City would therefore provide the financing for these facilities not covered by grants through revenue bonds. The County would own and finance the conveyance system and pump stations outside the City as well as the trunks 12 inches and larger in the County service area. The County could finance these facilities directly through revenue bonds, or by repaying under contract to the City for financing by City bonds.

The County would have further duties as coordinator, operating agency and contracting party in agreements with the City. The County would take the lead in the formation of Local Improvement Districts to finance and construct local collection sewers smaller than 12 inch. The County as lead agency for the facilities in County areas could either augment its own utilities operation and maintenance department or contract for the work with the City. Similarly for customer service, the County could either establish its own organization or contract for these services with the City.

Local Cost Considerations - The foregoing discussion about cost allocation of regional facilities is important in determining the level of monthly service charges. For the presently unsewered areas in North Spokane, there is the additional immediate concern for the funding of the connection charge for internal sewerage, that is for internal collection sewers less than 12 inch size. It should be recognized that this cost will have to be funded by methods other than those already discussed, namely by a Utilities Local Improvement District (ULID).

The area as a whole requires an assessment bond issue in 1980 of $10,900,000 (at escalated 1980 price level) to construct local benefit sewers serving 6,600 EDU's. Refer to Table 35. The bond service cost for 20 years at 8 percent is $1,110,000 per year or $168 per average EDU per year which would appear on the tax bill. De-escalated to 1974 price level, the cost is $114 per EDU per year. This calculated result is conservatively high based on EDU's served since the actual assessment will also cover vacant lots that benefit. The word average is emphasized since the actual individual assessment will depend upon application of an assessment formula to each individual parcel. The foregoing has assumed no offsetting aid through grants. A uniform policy relating to grants for this type of facility has not been established in Washington.

Without offsetting grants, the ULID financing is feasible and at a typical cost level. Note that the financial impact of the ULID portion of the work is approximately twice that of the regional facilities paid for by service charge.

Individual dwellings presently using individual on-site disposal also face a capital cost not covered by any public agency, namely alterations to plumbing on private property to connect public sewers at the property line. These costs will be highly variable on an individual basis depending upon the location and elevation of the existing septic tank and its relationship to the proposed public sewer house lateral. This cost can be a significant amount and is a difficult added financial burden for the individual in addition to his share of the publicly owned facilities. Unfortunately, financing for the private share of sewerage facilities must remain a matter for the individual to work out through normal home improvement financing channels.

Financial Requirements for Spokane Valley

For the Spokane Valley, the recommended lead agency is the County as owner and operator of facilities for the subarea. Local improvement districts would be utilized to construct local benefit facilities. Since only county areas are involved, except for the minor exception of the Town of Millwood, there is no need to consider alternative cost allocation plans. The equal payment for equal service method is appropriate.

Capital and operation and maintenance costs for the regional facilities for the Spokane Valley subsystem have been previously referenced in Tables 4 and 6 respectively. In a manner similar to that described above for the City-North Spokane subsystem, these costs are developed into financial

requirements based on revenue bond financing by the County for regional use facilities and assessment bonds for local benefit facilities. The capital cost and operation and maintenance cost summaries for regional use facilities are shown in Tables 18 and 20. The capital cost summary for local benefit facilities is summarized in Table 19. The operation and maintenance costs of local benefit facilities are merged with regional costs as shown in Table 34 under the headings "internal sewerage" and "customer service." The summary of financing of regional use facilities is shown in Table 23 based on revenue bonds at 7 percent interest.

A test is made in Table 25 to determine if additional capital accruals are necessary for depreciation. The test indicates that there is no need for additional accruals since the payments on bond principal exceed depreciation.

Subarea expenses and revenues are calculated in Table 34. The calculation shows an initial year service charge of $7.00 per month at 1974 price levels. This is ten percent higher than that which results for the equalization cost method for County areas in the City-North Spokane subsystem of $6.37, also at 1974 price levels. As more customers are brought into the Spokane Valley system, the service charge could be expected to fall, reaching a level of $4.86 at 1974 price level in year 2000.

The service charge of course does not reflect the recovery of the capital cost for local benefit facilities built with assessment bond financing. To finance local benefit sewers for 20,020 EDU's in 1985 assessment bonds

totaling $74,000,000 (at 1985 escalated price level) would be required without any credit for grant funding. As pointed out above, grant funding for this type of facility is highly uncertain at this time. The bond service cost for 20 years at 8 percent is $7,537,000 per year equal to an average of $376 per year per EDU. Refer to Table 35. In addition to the escalation from 1980 to 1985, the Spokane Valley cost is significantly higher than the North Spokane Cost due to the absence of any existing local benefit sewers and the more scattered development pattern. The annual cost per average EDU, which would be collected as an addition on the property tax bill, is $191 per year when de-escalated to 1974 prices. This cost is much higher than average. Although high, this is judged to be feasible on the basis that the average assessment in terms of 1974 price level at $2,100 per EDU is 12 percent of the average assessed valuation in Spokane Valley at $18,200 per parcel, also at 1974 price level.

## Financial Impact of Possible Upgrade to 1985 Standards

Interpreted 1985 Standards - In conformance with Corps of Engineers policy to protect the federal financial interest by consideration and evaluation of the impact of a possible upgrade of disposal standards to meet the goal expressed for 1985 in PL 92-500, this study has developed a recommended plan for upgrade as well as a recommended plan for 1983 statutory requirements. The 1985 goal of PL 92-500 has been interpreted in this study in terms of specific acceptable treatment systems, hence the designation "interpreted 1985 standards" to distinguish them from standards

actually detailed by law or administrative guidelines.

It has been postulated that it is unlikely that a national effort beyond the 1983 standards of PL 92-500 would take place before 1990. Therefore, this study assumes implementation of upgrading to take place in 1990.

The Recommended Plan for 1985 Standards - The recommended plan for upgrading of Plan A, the recommended plan to meet 1983 standards, is designated Plan D. Plan D provides for infiltration-percolation disposal to replace surface water disposal of Plan A for both the City-North Spokane and the Spokane Valley subsystems. Plan D is compatible with Plan A in that it utilizes the Plan A facilities and adds to them.

For the City STP, the infiltration-percolation site is on a terrace on the north side of Long Lake. The capital additions to the City STP facilities therefore include effluent pumping facilities and approximately 12.6 miles of transmission main in addition to the infiltration ponds themselves. The construction cost of the conveyance facilities and the infiltration ponds is estimated to be $18,400,000 with a project cost of $25,600,000. No additions to the treatment plant itself are required since it has been assumed that denitrification will not be required at this specific infiltration-percolation site since access to the receiving aquifer is limited.

The forecast operation and maintenance costs in 1990 of the City STP

with added facilities for infiltration-percolation disposal are $1,900,000 per year. This is less than the forecast O&M cost in 1990 with Plan A facilities for surface water disposal at $2,200,000 per year. The reason for the reduction is elimination of the need for year around phosphorus removal with its 1990 chemical costs of $670,000 which more than offsets the added costs of O&M for added conveyance and ponds under Plan D.

For the Spokane Valley STP, the infiltration-percolation site is on the downstream end of the aquifer as it approaches the Little Spokane River in the North Spokane area. The access to the aquifer downstream from the disposal site cannot be completely limited or controlled and it is assumed that denitrification will be required. Therefore, the added facilities required include, in addition to conveyance to the disposal site and the application ponds, the addition of nitrification-denitrification facilities to the treatment plant. The conveyance distance is approximately 10.2 miles. The estimated construction cost for the conveyance facilities and infiltration-percolation ponds is $7,800,000. The estimated construction cost of the nitrification-denitrification facilities is $3,400,000. Total estimated construction cost of additions is $11,200,000 for a project cost of $15,700,000.

The forecast operation and maintenance costs in 1990 of the upgraded Spokane Valley STP plus conveyance and ponds are $891,000 per year. Unlike the case for the City STP, these costs are significantly higher than the costs under Plan A conditions at $690,000. In this case the elimination

of the costs for phosphorus removal chemicals at $144,000 per year is more than offset by the addition of nitrification-denitrification at $220,000 per year.

Impact on the City-North Spokane Subsystem. If it is assumed that federal and state grant funding are the same in 1990 as at present, the estimated project cost of upgrading at $25,600,000 is reduced to $2,600,000 local cost. These costs would be an addition to the capital costs for regional use. The 1990 escalated cost would be $8,476,000 and would add approximately $700,000 to the annual bond service cost. Under Plan A the average annual bond service cost in 1990 is $1,315,000 (Table 27, equalized cost method). Under Plan D it would rise to approximately $2,015,000.

The annual regional operation and maintenance costs in 1990 under Plan A are $6,007,000. As indicated above, under Plan D the treatment and disposal operation and maintenance costs would experience a net decrease of $300,000 at 1974 price level. The decrease in terms of 1990 escalated dollars would be $792,000, making the annual O&M under Plan D equal to $5,215,000.

Since equalization compensation would remain unchanged, the Plan D regional expenses may be compared with Plan A as follows:

| | 1990 Expenses | |
|---|---|---|
| | Plan A | Plan D |
| Regional Operation and Maintenance | 6,007,000 | 5,215,000 |
| Equalization Compensation | 372,000 | 372,000 |
| Bond Service | 1,315,000 | 2,015,000 |
| Total Expenses | 7,694,000 | 7,602,000 |

This indicates that the cost to locals under Plan D at 1990 would be no more than for Plan A and might even be less. Note that this is not at variance with the cost effective analysis result which showed that Plan D was significantly more costly than Plan A. The apparently anomolous result in terms of cost to locals results from the offsetting of 90 percent of the capital costs by grants.

Impact on the Spokane Valley Subsystem - Again assuming future federal and state grant funding in 1990 comparable to the present, the estimated project cost of upgrading at $15,700,000 results in a local cost of approximately $1,600,000. The 1990 escalated local cost then becomes $5,216,000 and would add approximately $450,000 to the annual bond service cost. Under Plan A the average annual bond service cost in 1990 is $2,313,000 (Table 34). Under Plan D it would rise to $2,763,000.

The annual operation and maintenance costs under Plan D are shown above to increase $201,000 at 1974 price level. This increase is equal to $531,000 at escalated 1990 escalated dollars. The Plan A O&M costs shown in Table 34 for 1990 are $1,827,000. Under Plan D these costs would rise to $2,358,000.

Other system expenses for internal sewerage O&M, customer service and equalization compensation would remain unchanged at $692,800 for 1990 (Table 34). Thus Plan A and Plan D expenses at 1990 can be compared as follows:

| | 1990 Expenses | |
|---|---|---|
| | Plan A | Plan D |
| Regional Operation and Maintenance | $1,827,000 | $2,358,000 |
| Unchanged Elements of Expense | 692,800 | 692,800 |
| Bond Service | 2,313,000 | 2,763,000 |
| Total Expenses | $4,832,800 | $5,813,800 |

Unlike, the City-North Spokane Subarea, the Spokane Valley Subarea would experience a twenty percent increase in annual expense under the implementation of Plan D in 1990. The corresponding increase in the monthly service charge would also be approximately 20 percent, raising the de-escalated service charge for Plan A in 1990 at $5.93 to approximately $7.12 for Plan D at 1990. This is high but not infeasible. As shown above, the internal sewerage cost remains the primary factor in financial feasibility for the Spokane Valley.

Incremental Development Plan

In addition to the above described subsystems, it is anticipated that there may be incremental implementation of subsystems in multiple stages. The implementation plan and related financing plan should optionally provide for this possibility. This is particularly true in Spokane Valley where the difficulties of developing and financing a single project serving the total urban area would be substantial. For this reason, it is considered that an incremental financing plan staged in response to an incremental development plan is implied as an element of the financing plan described herein, but is

not detailed due to lack of any firm basis of definition at this time. This lack of definition results from the fact that decisions both at the local political level and at the level of state and federal agencies are required with regard to relative priorities of need and availability of financing. Because of the potential complexity of incremental development plans and the need for political decisions which will only be made at a more advanced stage of planning and implementation, it has not been considered that inclusion of an assumed incremental financing plan is appropriate at this time other than recognizing that this concept, relative to the "corridor plan" concept for Spokane Valley or other possible incremental development units should be formally recognized. For this reason forecast subsystem costs are not further subdivided with regard to potential incremental development units such as the "corridor plan".

TABLE 1
HISTORICAL COST OF CITY OF SPOKANE
SEWERAGE FACILITIES*

| Year | Interceptors | Treatment Plants | Pump Stations | Grants | |
|---|---|---|---|---|---|
| | | | | State | Federal |
| 1945-1956 | $2,820,000 | $ | $ | $1,051,000 | $ -- |
| 1958 | 71,000 | 1,597,000 | 145,000 | -- | -- |
| | -- | 483,000 | 96,000 | -- | -- |
| 1959 | -- | 8,000 | 1,000 | -- | -- |
| 1960 | 105,000 | 15,000 | -- | -- | 158,000 |
| 1961 | 913,000 | 2,000 | -- | -- | 92,000 |
| 1962 | -- | 479,000 | 101,000 | -- | 110,000 |
| | -- | 414,000 | -- | -- | -- |
| 1963 | -- | 6,000 | 30,000 | -- | 123,000 |
| 1964 | 211,000 | 16,000 | 8,000 | -- | 7,000 |
| 1966 | -- | 6,000 | 7,000 | -- | -- |
| 1967 | -- | 1,000 | -- | -- | -- |
| 1968 | -- | 316,000 | 5,000 | -- | -- |
| 1970 | -- | 9,000 | 1,000 | -- | -- |
| 1971 | -- | 110,000 | 11,000 | -- | -- |
| 1972 | -- | 5,000 | 103,000 | -- | -- |
| 1973 | -- | 256,000 | -- | 49,000 | 122,000 |
| 1974-75 Est. | -- | 45,800,000 | -- | 6,751,000 | 34,350,000 |
| Totals | $4,120,000 | $49,523,000 | $508,000 | $7,851,000 | $34,962,000 |

*Based on City records.

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TABLE 2
SUMMARY, HISTORICAL COST OF
EXISTING SEWERAGE FACILITIES

| Entity | Description | Estimated Major Facilities Investment[1] | Total Grants |
|---|---|---|---|
| City of Spokane | | | |
| Treatment Plant | 40 mgd primary treatment | $ 628,000 | $ 171,000 |
| Interceptors | 24 inches to 72 inches | 1,030,000 | -- |
| Pump Stations | numerous | 127,000 | -- |
| Improvements in Progress | secondary treatment plant | 45,800,000 | 41,101,000 |
| Town of Millwood | | | |
| Treatment Facility | small treatment system | 10,000[2] | -- |
| Interceptors | collection system only | -- | -- |
| Vera Irrigation District #15 | | | |
| Treatment Facility | three small systems | Donated by Developer | -- |
| Interceptors | collection system only | -- | -- |
| Whitworth Water District #2 | | | |
| Treatment Facility | operates developer-owned treatment system | -- | -- |
| Interceptors | collection system only | -- | -- |
| Liberty Lake Sewer District #1 | | | |
| Treatment Facility | possible purchase of private system | -- | -- |
| Interceptors | collection system only | -- | -- |
| Spokane County | | | |
| Treatment Facility | | -- | -- |
| Interceptors | | -- | -- |

1 - Based on entity records.
2 - Estimated treatment system cost out of $59,000 total investment including collection sewers.

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ABLE 3
CAPITAL COST SUMMARY*
CITY-NORTH SPOKANE SUBSYSTEM

| Year | Internal Sewerage Facilities | | | Conveyance N. Spokane to City STP | Additions to City STP | Total |
|---|---|---|---|---|---|---|
| | | City Service Area | | | | |
| | N. Spokane Service Area | New Customers | Correction of Existing Sewers | | | |
| 1980 | 8,647,000 | 152,000 | 7,000,000 | 4,297,000 | 300,000 | 20,396,000 |
| 1981 | 133,000 | 152,000 | 7,000,000 | -- | -- | 7,285,000 |
| 1982 | 133,000 | 152,000 | 7,000,000 | -- | -- | 7,285,000 |
| 1983 | 133,000 | 152,000 | 7,000,000 | -- | -- | 7,285,000 |
| 1984 | 133,000 | 152,000 | 7,000,000 | -- | -- | 7,285,000 |
| 1985 | 1,469,000 | 167,000 | 7,000,000 | -- | -- | 8,636,000 |
| 1986 | 221,000 | 167,000 | 7,000,000 | -- | -- | 7,388,000 |
| 1987 | 221,000 | 167,000 | 7,000,000 | -- | -- | 7,388,000 |
| 1988 | 221,000 | 167,000 | -- | -- | -- | 388,000 |
| 1989 | 221,000 | 167,000 | -- | -- | -- | 388,000 |
| 1990 | 6,328,000 | 205,000 | -- | 1,408,000 | 700,000 | 8,641,000 |
| 1991 | 501,000 | 205,000 | -- | -- | -- | 706,000 |
| 1992 | 501,000 | 205,000 | -- | -- | -- | 706,000 |
| 1993 | 501,000 | 205,000 | -- | -- | -- | 706,000 |
| 1994 | 501,000 | 205,000 | -- | -- | -- | 706,000 |
| 1995 | 683,000 | 268,000 | -- | -- | -- | 951,000 |
| 1996 | 683,000 | 268,000 | -- | -- | -- | 951,000 |
| 1997 | 683,000 | 268,000 | -- | -- | -- | 951,000 |
| 1998 | 683,000 | 268,000 | -- | -- | -- | 951,000 |
| 1999 | 683,000 | 268,000 | -- | -- | -- | 951,000 |
| 2000 | -- | -- | -- | -- | -- | --- |
| Totals | 23,279,000 | 3,960,000 | 56,000,000 | 5,705,000 | 1,000,000 | 89,944,000 |

*As Project Cost = 1.4 x Construction Cost for structural elements and 1.25 x acquisition cost for land.

TABLE 4
CAPITAL COST SUMMARY[1]
SPOKANE VALLEY SUBSYSTEM

| Year | Internal Sewerage Facilities[2] | Treatment Plant | Disposal Outfall | Total |
|---|---|---|---|---|
| 1985 | $41,587,000 | $9,336,000 | $1,708,000 | $52,631,000 |
| 1986 | 507,000 | -- | -- | 507,000 |
| 1987 | 507,000 | -- | -- | 507,000 |
| 1988 | 507,000 | -- | -- | 507,000 |
| 1989 | 507,000 | -- | -- | 507,000 |
| 1990 | 2,540,000 | -- | -- | 2,540,000 |
| 1991 | 462,000 | -- | -- | 462,000 |
| 1992 | 462,000 | -- | -- | 462,000 |
| 1993 | 462,000 | -- | -- | 462,000 |
| 1994 | 462,000 | -- | -- | 462,000 |
| 1995 | 2,488,000 | -- | -- | 2,488,000 |
| 1996 | 582,000 | -- | -- | 582,000 |
| 1997 | 582,000 | -- | -- | 582,000 |
| 1998 | 582,000 | -- | -- | 582,000 |
| 1999 | 582,000 | -- | -- | 582,000 |
| 2000 | 1,304,000 | -- | -- | 1,304,000 |
| 2001 | 486,000 | -- | -- | 486,000 |
| 2002 | 486,000 | -- | -- | 486,000 |
| 2003 | 486,000 | -- | -- | 486,000 |
| 2004 | 486,000 | -- | -- | 486,000 |
| 2005 | -- | -- | -- | -- |
| Totals | $56,067,000 | $9,336,000 | $1,708,000 | $67,111,000 |

1 - As project costs = 1.4 x construction cost for structural elements and 1.25 x acquisition cost for land.

2 - Does not include Liberty Lake internal sewerage or transmission.

TABLE 5
OPERATION AND MAINTENANCE COSTS
CITY-NORTH SPOKANE SUBSYSTEM

| Cost Element | Average Annual Costs at Year | | | | |
|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1995 | 2000 |
| Treatment Plant | $2,098,000 | $2,146,000 | $2,204,000 | $2,256,000 | $2,303,000 |
| Conveyance Facilities | 49,400 | 51,300 | 71,300 | 73,500 | 75,600 |
| Internal Sewerage, North Spokane | 32,000 | 34,800 | 39,500 | 62,900 | 77,300 |
| Internal Sewerage, City | 489,300 | 360,200 | 365,000 | 370,000 | 378,600 |
| Customer Service, North Spokane | 58,500 | 63,600 | 72,100 | 115,100 | 141,400 |
| Customer Service, City | 569,400 | 576,400 | 584,000 | 593,400 | 605,700 |
| Interim Facilities | 8,100 | 6,900* | -- | -- | -- |
| TOTAL | $3,304,700 | $3,239,200 | $3,335,900 | $3,471,800 | $3,581,600 |

* Operation extends to 1989.

TABLE 6
OPERATION AND MAINTENANCE COSTS
SPOKANE VALLEY SUBSYSTEM

| | Average Annual Costs at Year | | | | |
|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1995 | 2000 |
| Treatment Plant and Outfall | $ -- | $ 667,000 | $ 692,000 | $ 713,000 | $ 742,000 |
| Internal Sewerage* | -- | 84,000 | 93,000 | 105,000 | 118,000 |
| Customer Service* | -- | 153,000 | 169,000 | 192,000 | 216,000 |
| TOTAL | $ -- | $ 904,000 | $ 954,000 | $1,010,000 | $1,076,000 |

* Does not include Liberty Lake.

TABLE 7
HISTORICAL TREND OF NATIONAL
CONSUMER PRICE INDEX

| Year | National Consumer Price Index | Change Percent |
|---|---|---|
| 1963 | 91.8 | -- |
| 1964 | 93.0 | 1.3 |
| 1965 | 94.5 | 1.7 |
| 1966 | 97.2 | 2.9 |
| 1967 | 100.0 | 2.8 |
| 1968 | 104.2 | 4.2 |
| 1969 | 109.7 | 5.3 |
| 1970 | 116.2 | 5.9 |
| 1971 | 121.2 | 4.3 |
| 1972 | 125.3 | 3.4 |
| 1973 | 133.1 | 6.2 |
| 1974 | 147.7 | 11.0 |
| 1975 | -- | 9.0* |
| 1976 | -- | 7.0* |

* Estimated

TABLE 8
OPERATING COST ESCALATION INDEX*

| Year | Escalation Rate Percent | Index Compute Current Dollar Value |
|---|---|---|
| Mid 1974 | - | 1.00 |
| Mid 1975 | 9.0 | 1.09 |
| Mid 1976 | 7.0 | 1.17 |
| Mid 1977 | 6.0 | 1.24 |
| Mid 1978 | 6.0 | 1.31 |
| Mid 1979 | 6.0 | 1.39 |
| Mid 1980 | 6.0 | 1.47 |
| Mid 1981 | 6.0 | 1.56 |
| Mid 1982 | 6.0 | 1.65 |
| Mid 1983 | 6.0 | 1.75 |
| Mid 1984 | 6.0 | 1.86 |
| Mid 1985 | 6.0 | 1.97 |
| Mid 1986 | 6.0 | 2.09 |
| Mid 1987 | 6.0 | 2.21 |
| Mid 1988 | 6.0 | 2.35 |
| Mid 1989 | 6.0 | 2.49 |
| Mid 1990 | 6.0 | 2.64 |
| Mid 1991 | 6.0 | 2.80 |
| Mid 1992 | 6.0 | 2.96 |
| Mid 1993 | 6.0 | 3.14 |
| Mid 1994 | 6.0 | 3.33 |
| Mid 1995 | 6.0 | 3.53 |
| Mid 1996 | 6.0 | 3.74 |
| Mid 1997 | 6.0 | 3.96 |
| Mid 1998 | 6.0 | 4.20 |
| Mid 1999 | 6.0 | 4.45 |
| Mid 2000 | 6.0 | 4.72 |

* (Escalation Index) X (Current Dollar Estimate) = (Escalated Cost).

TABLE 9
CAPITAL COST ESCALATION INDEX*

| Year | Escalation Rate Percent | Index To Compute Current Dollar Value |
|---|---|---|
| Mid 1974 | - | 1.00 |
| Mid 1975 | 10 | 1.10 |
| Mid 1976 | 7.5 | 1.18 |
| Mid 1977 | 7.5 | 1.27 |
| Mid 1978 | 7.5 | 1.37 |
| Mid 1979 | 7.5 | 1.47 |
| Mid 1980 | 7.5 | 1.58 |
| Mid 1981 | 7.5 | 1.70 |
| Mid 1982 | 7.5 | 1.83 |
| Mid 1983 | 7.5 | 1.96 |
| Mid 1984 | 7.5 | 2.11 |
| Mid 1985 | 7.5 | 2.27 |
| Mid 1986 | 7.5 | 2.44 |
| Mid 1987 | 7.5 | 2.62 |
| Mid 1988 | 7.5 | 2.82 |
| Mid 1989 | 7.5 | 3.03 |
| Mid 1990 | 7.5 | 3.26 |
| Mid 1991 | 7.5 | 3.50 |
| Mid 1992 | 7.5 | 3.76 |
| Mid 1993 | 7.5 | 4.04 |
| Mid 1994 | 7.5 | 4.35 |
| Mid 1995 | 7.5 | 4.67 |
| Mid 1996 | 7.5 | 5.02 |
| Mid 1997 | 7.5 | 5.40 |
| Mid 1998 | 7.5 | 5.81 |
| Mid 1999 | 7.5 | 6.24 |
| Mid 2000 | 7.5 | 6.71 |

*(Escalation Index) X (Current Dollar Estimate) = (Escalated Cost).

Table 10
PROJECTED SERVICE POPULATIONS,
SPOKANE URBAN PLANNING AREA

| | 1975* | 1980 | 1985 | 1990 | 1995 | 2000 | 2020 |
|---|---|---|---|---|---|---|---|
| Spokane Valley | 61,077 | 52,227 | 57,737 | 63,166 | 69,154 | 74,061 | 91,021 |
| North Spokane | 22,466 | 17,220 | 19,818 | 29,443 | 36,080 | 44,627 | 62,482 |
| City | 172,578 | 174,107 | 175,519 | 177,026 | 178,681 | 180,392 | 191,032 |
| Moran Prairie | 4,552 | 3,097 | 3,714 | 4,392 | 5,515 | 7,438 | 11,007 |
| South West | 3,004 | 741 | 887 | 1,088 | 1,241 | 1,452 | 2,276 |
| Sub-Total | 263,677 | 247,392 | 257,675 | 275,105 | 290,671 | 307,970 | 357,818 |
| West Plateau | 2,483 | 1,807 | 1,993 | 2,187 | 2,401 | 2,614 | 3,532 |
| Fairchild AFB | 6,700 | 6,700 | 6,700 | 6,700 | 6,700 | 6,700 | 6,700 |
| Sub-Total | 9,183 | 8,507 | 8,693 | 8,887 | 9,101 | 9,314 | 10,232 |
| TOTAL | 272,680 | 255,899 | 266,368 | 283,992 | 299,772 | 317,284 | 368,050 |
| Newman Lake | 160 | 147 | 286 | 435 | 592 | 752 | 1,418 |
| Liberty Lake | 944 | 953 | 1,141 | 1,342 | 1,467 | 1,580 | 2,097 |

* Total population. After 1975 populations are those receiving sewerage service.

TABLE 11
NUMBER OF SEWERAGE CUSTOMERS*
SPOKANE URBAN PLANNING AREA

| | 1980 | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|
| City of Spokane | | | | | |
| Residential | 58,035 | 58,505 | 59,010 | 59,560 | 60,130 |
| Commercial & Non-Residential | 8,705 | 8,775 | 8,850 | 8,935 | 9,020 |
| Total | 66,740 | 67,280 | 67,860 | 68,495 | 69,150 |
| Spokane Valley | | | | | |
| Residential | 17,410 | 19,245 | 21,055 | 23,050 | 24,685 |
| Commercial & Non-Residential | 2,610 | 2,885 | 3,160 | 3,460 | 3,705 |
| Total | 20,020 | 22,130 | 24,215 | 26,510 | 28,390 |
| North Spokane | | | | | |
| Residential | 5,740 | 6,605 | 9,815 | 12,025 | 14,875 |
| Commercial & Non-Residential | 860 | 990 | 1,470 | 1,805 | 2,230 |
| Total | 6,600 | 7,595 | 11,285 | 13,830 | 17,105 |
| North Spokane | | | | | |
| Inside City | 955 | 1,186 | 2,679 | 3,302 | 4,004 |
| Outside City (County) | 5,645 | 6,409 | 8,606 | 10,528 | 13,101 |
| Total | 6,600 | 7,595 | 11,285 | 13,830 | 17,105 |

*Based on Equivalent Dwelling Units (EDU's).

TABLE 12
SUMMARY OF BONDED DEBT FOR SEWERAGE
SPOKANE URBAN PLANNING AREA

| Entity | Year of Issue | Amount | Outstanding | Average Annual Bond Service |
|---|---|---|---|---|
| City of Spokane | | | | |
| Sewer Revenue Bonds | 1960 | $1,000,000 | $348,000 | $72,000 |
| Town of Millwood | | No Sewerage Bonds Outstanding | | |
| Vera Irrigation District #15 | | No Sewerage Bonds Outstanding | | |
| Whitworth Water District #1 | | No Sewerage Bonds Outstanding | | |
| Liberty Lake Sewer District #1 | | No Sewerage Bonds Outstanding* | | |
| Spokane County | | No Sewerage Bonds Outstanding | | |

*Voters approved $1.7 million sewer revenue bonds in November 1974.

TABLE 13
GROWTH OF ASSESSED VALUATION
FOR CITY OF SPOKANE AND SPOKANE COUNTY

| Year | Assessed Valuation City of Spokane(1) | Percent Increase (3) | Assessed Valuation Spokane County(2) | Percent Increase(3) |
|---|---|---|---|---|
| 1965 | $ 239,109,000 | - | $ 362,550,000 | - |
| 1966 | 242,843,000 | 1.6 | 374,582,000 | 3.3 |
| 1967 | 249,810,000 | 2.9 | 388,794,000 | 3.8 |
| 1968 | 256,046,000 | 2.5 | 406,378,000 | 4.5 |
| 1969 | 261,376,000 | 2.1 | 438,427,000 | 7.9 |
| 1970 | 277,146,000 | 6.0 | 933,798,000 | 6.5 |
| 1971 | 531,130,000 | (4.2) | 919,135,000 | (1.6) |
| 1972 | 562,508,000 | 5.9 | 1,088,068,000 | 18.4 |
| 1973 | 627,184,000 | 11.5 | 1,178,338,000 | 8.3 |
| 1974 | $1,390,827,000 | 10.9 | $2,582,342,000 | 9.6 |
| Average Compound Growth 1965-74 | | 4.5 | | 6.5 |

Notes:

(1) Assessed valuation was 25 percent of market value through 1970, 50 percent through 1973 and 100 percent in 1974.
(2) Assessed valuation was 25 percent of market value through 1969, 50 percent through 1973 and 100 percent in 1974.
(3) Percent increase (or decrease) is expressed in terms the common basis of market value to recognize the changing ratio of assessed to market value. Parentheses indicate negative numbers.

TABLE 14
ASSESSED VALUATION OF
SUBSYSTEM SERVICE AREAS

| | Service Area | |
|---|---|---|
| | North Spokane | Spokane Valley |
| Land | $ 25,718,740 | $ 59,830,360 |
| Improvements | 119,949,060 | 336,071,190 |
| Total | $145,667,800 | $395,901,550 |
| Number of Parcels | 6,256 | 21,801 |
| Average Value per Parcel | $23,300 | $18,200 |

TABLE 15
CAPITAL COST SUMMARY - REGIONAL USE FACILITIES
FOR CITY-NORTH SPOKANE SUBSYSTEM

| Facility | Year | Estimated Cost | Escalation Index | Escalated Cost |
|---|---|---|---|---|
| Conveyance to North Spokane | 1980 | $4,297,000 | 1.58 | $6,789,000 |
| Additions to City Treatment Plant | 1980 | 300,000 | 1.58 | 474,000 |
| Trunks, Interceptors 12" and Larger, Force Mains and, Pump Stations | 1980 | $1,762,000 | 1.58 | $2,784,000 |
| | 1985 | 989,000 | 2.27 | 2,244,000 |
| | 1990 | 2,602,000 | 3.26 | 8,481,000 |

801-4-78

TABLE 16
CAPITAL COST SUMMARY FOR LOCAL BENEFIT FACILITIES
FOR CITY AND NORTH SPOKANE SUBSYSTEM

| | | North Spokane | | City | | | |
|---|---|---|---|---|---|---|---|
| Year | Escalation Index[1] | Internal Sewerage Facilities Cost[2] | Escalated Cost | New Customer Facilities Cost[2] | Escalated Cost | Existing Sewers Corrections | Escalated Cost |
| 1980 | 1.58 | $ 6,885,000 | $10,878,000 | $ 152,000 | $ 240,000 | $ 7,000,000 | $ 11,060,000 |
| 1981 | 1.70 | 133,000 | 226,000 | 152,000 | 258,000 | 7,000,000 | 11,900,000 |
| 1982 | 1.83 | 133,000 | 243,000 | 152,000 | 278,000 | 7,000,000 | 12,810,000 |
| 1983 | 1.96 | 133,000 | 261,000 | 152,000 | 298,000 | 7,000,000 | 13,720,000 |
| 1984 | 2.11 | 133,000 | 281,000 | 152,000 | 321,000 | 7,000,000 | 14,770,000 |
| 1985 | 2.27 | 480,000 | 1,090,000 | 167,000 | 379,000 | 7,000,000 | 15,890,000 |
| 1986 | 2.44 | 221,000 | 539,000 | 167,000 | 407,000 | 7,000,000 | 17,080,000 |
| 1987 | 2.62 | 221,000 | 579,000 | 167,000 | 438,000 | 7,000,000 | 18,340,000 |
| 1988 | 2.82 | 221,000 | 623,000 | 167,000 | 471,000 | -- | -- |
| 1989 | 3.03 | 221,000 | 670,000 | 205,000 | 506,000 | -- | -- |
| 1990 | 3.26 | 3,726,000 | 12,147,000 | 205,000 | 668,000 | -- | -- |
| 1991 | 3.50 | 501,000 | 1,754,000 | 205,000 | 718,000 | -- | -- |
| 1992 | 3.76 | 501,000 | 1,884,000 | 205,000 | 771,000 | -- | -- |
| 1993 | 4.04 | 501,000 | 2,024,000 | 205,000 | 828,000 | -- | -- |
| 1994 | 4.35 | 501,000 | 2,179,000 | 268,000 | 892,000 | -- | -- |
| 1995 | 4.67 | 683,000 | 3,190,000 | 268,000 | 1,252,000 | -- | -- |
| 1996 | 5.02 | 683,000 | 3,429,000 | 268,000 | 1,345,000 | -- | -- |
| 1997 | 5.40 | 683,000 | 3,688,000 | 268,000 | 1,447,000 | -- | -- |
| 1998 | 5.81 | 683,000 | 3,968,000 | 268,000 | 1,557,000 | -- | -- |
| 1999 | 6.24 | 683,000 | 4,262,000 | 268,000 | 1,672,000 | -- | -- |
| 2000 | 6.71 | -- | -- | -- | -- | -- | -- |
| Total | | $17,425,000 | $53,915,000 | $3,504,000 | $14,746,000 | $56,000,000 | $115,570,000 |

1 - As a financing safeguard, costs are escalated to year shown.
2 - Does not include trunk sewers 12" and larger in diameter, force mains and, pump stations.

801.4-79

TABLE 17
ESCALATED OPERATION AND MAINTENANCE COSTS
CITY - NORTH SPOKANE SUBSYSTEM[1]

| Cost Element | Year | | | | |
|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1995 | 2000 |
| Treatment Plant | $3,084,000 | $4,228,000 | $5,819,000 | $7,964,000 | $10,870,000 |
| Conveyance Facilities | 73,000 | 101,000 | 188,000 | 259,000 | 357,000 |
| Internal Sewerage-North Spokane | 47,000 | 69,000 | 104,000 | 222,000 | 365,000 |
| Internal Sewerage-City | 719,000 | 710,000 | 964,000 | 1,309,000 | 1,787,000 |
| Customer Service-North Spokane | 86,000 | 125,000 | 190,000 | 406,000 | 667,000 |
| Customer Service-City | 837,000 | 1,136,000 | 1,542,000 | 2,095,000 | 2,859,000 |
| Interim Facilities-City[2] | 12,000 | 14,000 | -- | -- | -- |

1 - Based on Table 5.
2 - Interim facilities to be charged at cost to those users receiving the service.

801.4-80

TABLE 18
CAPITAL COST SUMMARY - REGIONAL USE FACILITIES
FOR SPOKANE VALLEY SUBSYSTEM

| Facility | Year | Estimated Cost | Escalation Index | Escalated Cost |
|---|---|---|---|---|
| Treatment Plant | 1985 | $9,336,000 | 2.27 | $21,193,000 |
| Disposal Outfall | 1985 | $1,708,000 | 2.27 | $ 3,877,000 |
| Trunks, Interceptors 12" and Larger, Force Mains, and, Pump Stations | 1985 | $9,134,000 | 2.27 | $20,734,000 |
| | 1990 | 814,000 | 3.26 | 2,654,000 |
| | 1995 | 873,000 | 4.67 | 4,077,000 |
| | 2000 | 497,000 | 6.71 | 3,335,000 |

TABLE 19
CAPITAL COST SUMMARY FOR LOCAL BENEFIT FACILITIES
SPOKANE VALLEY SUBSYSTEM

| Year | Escalation Index[1] | Internal Sewerage Facilities Cost[2] | Escalated Cost |
|---|---|---|---|
| 1985 | 2.27 | $32,453,000 | $ 73,663,000 |
| 1986 | 2.44 | 507,000 | 1,237,000 |
| 1987 | 2.62 | 507,000 | 1,328,000 |
| 1988 | 2.82 | 507,000 | 1,430,000 |
| 1989 | 3.03 | 507,000 | 1,536,000 |
| 1990 | 3.26 | 1,726,000 | 5,627,000 |
| 1991 | 3.50 | 462,000 | 1,617,000 |
| 1992 | 3.76 | 462,000 | 1,737,000 |
| 1993 | 4.04 | 462,000 | 1,866,000 |
| 1994 | 4.35 | 462,000 | 2,010,000 |
| 1995 | 4.67 | 1,615,000 | 7,542,000 |
| 1996 | 5.02 | 582,000 | 2,922,000 |
| 1997 | 5.40 | 582,000 | 3,143,000 |
| 1998 | 5.81 | 582,000 | 3,381,000 |
| 1999 | 6.24 | 582,000 | 3,632,000 |
| 2000 | 6.71 | 807,000 | 5,415,000 |
| Subtotal | | $42,805,000 | $118,086,000 |
| 2001 | 7.21 | 486,000 | 3,504,000 |
| 2002 | 7.75 | 486,000 | 3,767,000 |
| 2003 | 8.34 | 486,000 | 4,053,000 |
| 2004 | 8.96 | 486,000 | 4,355,000 |
| Total | | $44,749,000 | $133,765,000 |

1 - As a financing safeguard, costs are escalated to year shown.
2 - Does not include trunks and sewers 12" and larger in diameter, force mains and, pump stations.

TABLE 20
ESCALATED OPERATION AND MAINTENANCE COSTS ($000)
SPOKANE VALLEY SUBSYSTEM

| Cost Element | Year 1980 | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|
| Treatment plant and outfall | $ -- | $1,314 | $1,827 | $2,517 | $3,597 |
| Internal sewerage | -- | 165 | 246 | 371 | 604 |
| Customer service | -- | 301 | 446 | 678 | 1,104 |
| Total | $ -- | $1,780 | $2,519 | $3,566 | $5,305 |

TABLE 21
SUMMARY OF FINANCING
FOR CITY AND NORTH SPOKANE SUBSYSTEM

| Facilities | Escalated Costs | Year | State & Federal Grants | Net Local Cost |
|---|---|---|---|---|
| Regional Facilities | | | | |
| North Spokane | $6,789,000 | 1980 | $6,110,000 | $ 679,000 |
| Conveyance | 4,590,000 | 1990 | 4,131,000 | 459,000 |
| Additions To | $ 474,000 | 1980 | $ 426,000 | $ 48,000 |
| City STP | 2,282,000 | 1990 | 2,054,000 | 228,000 |
| 12 inches & Larger | $2,784,000 | 1980 | -- | $2,784,000 |
| Trunks, FM and | 2,244,000 | 1985 | -- | 2,244,000 |
| PS | 8,481,000 | 1990 | -- | 8,481,000 |

801.4-84

Bond Sales Necessary

| Year | Bond Sale Amount[1] | Average Annual Bond Service[2] |
|---|---|---|
| 1980 | $ 3,870,000 | $325,000 |
| 1985 | 2,470,000 | 207,000 |
| 1990 | 10,085,000 | 846,000 |

Local Benefit Facilities

| Facilities | Cost In 1974 | Customers Benefiting (EDU's) | Cost Per Customer Benefited[3] |
|---|---|---|---|
| Internal North Spokane | $17,425,000 | 17,105 | $1,020 |
| Internal City | 3,504,000 | 2,410 | 1,460 |

1 - Based on net local cost plus about 10 percent reserve funds and issuance costs.
2 - Based on 25 years at 6.75 percent.
3 - Based on 1974 Dollars. Escalate at inflation rate and collect as a connection charge.

TABLE 22
FINANCING SEPARATION AND CORRECTIONS
OF EXISTING SEWERS - CITY OF SPOKANE

| Year | Escalated Cost of Sewer Corrections | State and Federal Grants[1] | Net Local Share |
|---|---|---|---|
| 1980 | $ 11,060,000 | $ 9,954,000 | $ 1,106,000 |
| 1981 | 11,900,000 | 10,710,000 | 1,190,000 |
| 1982 | 12,810,000 | 11,529,000 | 1,281,000 |
| 1983 | 13,720,000 | 12,348,000 | 1,372,000 |
| 1984 | 14,770,000 | 13,293,000 | 1,477,000 |
| 1985 | 15,890,000 | 14,301,000 | 1,589,000 |
| 1986 | 17,080,000 | 15,372,000 | 1,708,000 |
| 1987 | 18,340,000 | 16,506,000 | 1,834,000 |
| Totals | $115,570,000 | $104,013,000 | $11,557,000[2] |

BOND SALES TO FINANCE SEPARATION AND CORRECTION

| Year | Principal Amount[3] | Average Annual Bond Service[4] |
|---|---|---|
| 1980 | $2,300,000 | $193,000 |
| 1982 | 2,650,000 | 222,000 |
| 1984 | 3,070,000 | 258,000 |
| 1986 | 3,540,000 | 297,000 |

1 - Assumes sewer corrections are fully grant eligible.
2 - If equalization method is used, may finance some sewer corrections from equalization compensation payments. If other cost sharing methods are used, finance through combination of bonds and pay-as-you-go.
3 - Offer bonds on alternative years.
4 - Based on 25 years at 6.75 percent interest.

TABLE 23
SUMMARY OF FINANCING
SPOKANE VALLEY SUBSYSTEM

| Facilities | Escalated Costs | Year | State & Federal Grants | Net Local Costs |
|---|---|---|---|---|
| Regional Facilities | | | | |
| Treatment plant | $ 9,336,000 | 1985 | $8,402,000 | $ 934,000 |
| Disposal outfall | 1,708,000 | 1985 | 1,537,000 | 171,000 |
| Trunks, interceptors 12", | 20,734,000 | 1985 | -- | 20,734,000 |
| and larger, force mains, | 2,654,000 | 1990 | -- | 2,654,000 |
| pump stations | 4,077,000 | 1995 | -- | 4,077,000 |
| | 3,335,000 | 2000 | -- | 3,335,000 |

Bond Sales Necessary

| Year | Bond Sale Amount[1] | Average Annual Bond Service[2] |
|---|---|---|
| 1985 | $24,025,000 | $2,062,000 |
| 1990 | 2,920,000 | 251,000 |
| 1995 | 4,485,000 | 385,000 |
| 2000 | 3,670,000 | 315,000 |

Local Benefit Facilities

| Facilities | Cost in 1974 | Customers Benefiting (EDU's) | Cost Per User Benefited[3] |
|---|---|---|---|
| Gravity sewers less than 12" ø and side sewers | $42,805,000 | 28,390 | $ 1,508 |

1 - Based on net local cost plus about 10 percent reserve funds and issuance costs.
2 - Based on 25 years at 7 percent.
3 - Based on 1974 dollars. Escalate at inflation rate and collect as a connection charge.

801.4-86

TABLE 24
ESTIMATED DEPRECIATION COMPARED TO CAPITAL EXPENSE
CITY AND NORTH SPOKANE SUBAREA

| Facilities | Life for Expenditure Test[1] (Years) | Original Cost | Annual Depreciation |
|---|---|---|---|
| Starting 1980 | | | |
| 40 Mgd. STP | 30 | $45,800,000 | $1,527,000 |
| Pump Stations (Existing) | 30 | 508,000 | 17,000 |
| Additions to STP | 30 | 474,000 | 16,000 |
| New Pump Stations | 30 | 2,625,000 | 88,000 |
| Subtotal | | | $1,648,000 |
| Starting 1985 | | | |
| Pump Stations | 30 | $ 804,000 | $ 27,000 |
| Starting 1990 | | | |
| Pump Stations | 30 | $ 1,734,000 | $ 58,000 |
| Treatment Plant | 30 | 2,282,000 | 76,000 |
| Total - Year 2000 | | | $1,809,000 |

801.4-87

DEPRECIATION AND CAPITAL EXPENSE COMPARISON

| Year | Annual Depreciation | Less: Bond Principal | + | Total Capital Expenditures | + | Less: Installment Principal | Additional Capital Accrual[2] |
|---|---|---|---|---|---|---|---|
| 1980 | $1,648,000 | $ 155,000 | | $11,118,000 | | $213,000 | -- |
| 1985 | 1,675,000 | 345,000 | | 1,489,000 | | 213,000 | -- |
| 1990 | 1,809,000 | 657,000 | | 12,815,000 | | 213,000 | -- |
| 1995 | 1,809,000 | 930,000 | | 4,342,000 | | 213,000 | -- |
| 2000 | 1,809,000 | 1,310,000 | | 5,934,000 | | 213,000 | -- |

1 - Based on federal guidelines for capital recovery test.
2 - One measure of annual capital expense adequacy is to fund the higher of either annual depreciation or capital expenditures plus debt principal payments. Because capital expenditures plus debt principal exceeds annual depreciation, no accrual to capital reserve appears necessary during the period of this study.

TABLE 25
ESTIMATED DEPRECIATION COMPARED TO CAPITAL EXPENSE
SPOKANE VALLEY SUBAREA

| Facilities | Life for Expenditure Test (yrs)[1] | Original Cost | Annual Depreciation |
|---|---|---|---|
| Starting 1985 | | | |
| Treatment plant | 30 | $9,336,000 | $311,000 |
| Pump stations | 30 | 610,000 | 20,000 |
| Subtotal | | | $331,000 |
| Starting 2000 | | | |
| Pump stations | 30 | $1,080,000 | $ 36,000 |
| Total - year 2000 | | | $367,000 |

Depreciation and Capital Expense Comparison

| Year | Annual Depreciation | Less: Bond Principal | Additional Capital Accrual[2] |
|---|---|---|---|
| 1985 | $331,000 | $ 385,000 | -- |
| 1990 | 331,000 | 580,000 | -- |
| 1995 | 331,000 | 905,000 | -- |
| 2000 | 367,000 | 1,305,000 | -- |

1 - Based on federal guidelines for capital recovery test.
2 - One measure of annual capital expense adequacy is to fund the higher of either annual depreciation or capital expenditures plus bond principal payments. Because capital expenditures for bond principal alone greatly exceeds annual depreciation, no accrual to capital reserve is necessary during the period of this study.

801.4-88

TABLE 26
EQUALIZATION -COMPENSATION PLAN
SPOKANE URBAN PLANNING AREA

| | Estimated Original Cost | Less: Grants | Net Local Investment | Principal Installments | Interest First Year |
|---|---|---|---|---|---|
| City of Spokane | $47,585,000 | $42,272,000 | $5,313,000 | $213,000 | $265,000 |
| Town of Millwood | $ 10,000 | $ -- | $ 10,000 | $ 400 | $ 500 |

TABLE 27
SUBAREA REVENUES AND EXPENSES EQUALIZED COSTS
CITY AND NORTH SPOKANE SUBSYSTEM

| | Year | | | | |
|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1995 | 2000 |
| Number of Connections (EDU's) | 73,340 | 74,875 | 79,145 | 82,325 | 86,255 |
| New EDU's (Annual) | 275 | 775 | 575 | 700 | 500 |
| Service Charge (Monthly) | $4.40 | $5.50 | $7.75 | $9.35 | $11.60 |
| Connection Charge (Regional) | $ 315 | $ 450 | $ 650 | $ 935 | $1,340 |
| Service Charge De-Escalated | $2.99 | $2.80 | $2.94 | $2.65 | $2.46 |
| Revenues | | | | | |
| Service Charge | $3,873,000 | $4,942,000 | $7,360,000 | $9,237,000 | $12,007,000 |
| Connection Charges | 87,000 | 349,000 | 374,000 | 655,000 | 804,000 |
| Total Revenues | $3,960,000 | $5,291,000 | $7,734,000 | $9,892,000 | $12,811,000 |
| Expenses | | | | | |
| Regional Operation and Maintenance | $3,157,000 | $4,329,000 | $6,007,000 | $8,223,000 | $11,227,000 |
| Equalization Compensation | 478,000 | 425,000 | 372,000 | 319,000 | 266,000 |
| Bond Service | 325,000 | 532,000 | 1,315,000 | 1,315,000 | 1,315,000 |
| Total Expenses | $3,960,000 | $5,286,000 | $7,694,000 | $9,857,000 | $12,808,000 |

TABLE 28
CITY REVENUES AND EXPENSES EQUALIZED COSTS
CITY AND NORTH SPOKANE SUBAREA

| | Year | | | | |
|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1995 | 2000 |
| Number of Connections (EDU's) | 67,695 | 68,466 | 70,539 | 71,797 | 73,154 |
| New EDU's Annual | 155 | 415 | 250 | 270 | 230 |
| Service Charge (Monthly) | | | | | |
| Subareawide | $4.40 | $5.50 | $7.75 | $9.35 | $11.60 |
| Local | 1.66 | 2.55 | 3.67 | 4.71 | 6.10 |
| Connection Charge (Internal)* | $2,305 | $3,315 | $4,760 | $6,820 | $9,800 |
| Total Regional plus Local Service Charge-De-Escalated | $4.12 | $4.09 | $4.33 | $3.98 | $3.75 |
| Revenues | | | | | |
| Subareawide Service Charges | $3,574,000 | $4,519,000 | $ 6,560,000 | $ 8,056,000 | $10,183,000 |
| Local Sewerage Service Charges | 1,348,000 | 2,095,000 | 3,107,000 | 4,058,000 | 5,355,000 |
| Equalization Compensation | 478,000 | 425,000 | 372,000 | 319,000 | 266,000 |
| Total Revenues | $5,400,000 | $7,039,000 | $10,039,000 | $12,433,000 | $15,804,000 |
| Expenses | | | | | |
| Subarea Expenses | $3,574,000 | $4,519,000 | $ 6,560,000 | $ 8,056,000 | $10,183,000 |
| Internal Sewerage O & M | 719,000 | 710,000 | 964,000 | 1,309,000 | 1,787,000 |
| Customer Service | 837,000 | 1,136,000 | 1,542,000 | 2,095,000 | 2,859,000 |
| Present Bond Service | 72,000 | -- | -- | -- | -- |
| Bonds For Sewer Corrections | 193,000 | 673,000 | 970,000 | 970,000 | 970,000 |
| Total Expenses | $5,395,000 | $7,038,000 | $10,036,000 | $12,430,000 | $15,799,000 |

* Represents the level of charge to finance local benefit improvements. The revenue from this charge is not shown on this table.

TABLE 29
NORTH SPOKANE (COUNTY) REVENUES AND EXPENSES EQUALIZED COSTS
CITY AND NORTH SPOKANE SUBAREA

| | Year | | | | |
|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1995 | 2000 |
| Number of Connections (EDU's) | 5,645 | 6,409 | 8,606 | 10,528 | 13,101 |
| New EDU's Annual | 120 | 360 | 325 | 430 | 370 |
| Service Charge (Monthly) | | | | | |
| Subareawide | $4.40 | $5.50 | $7.75 | $9.35 | $11.60 |
| Local | 1.97 | 2.53 | 2.85 | 4.98 | 6.57 |
| Connection Charge (Internal)* | $1,610 | $2,315 | $3,325 | $4,765 | $6,845 |
| Total Regional plus Local Service Charge - De-Escalated | $4.33 | $4.08 | $4.02 | $4.06 | $3.85 |
| Revenues | | | | | |
| Subareawide Service Charges | $298,000 | $423,000 | $ 800,000 | $1,181,000 | $1,824,000 |
| Local Sewerage Service Charges | 133,000 | 195,000 | 294,000 | 629,000 | 1,033,000 |
| Equalization Compensation | -- | -- | -- | -- | -- |
| Total Revenues | $431,000 | $618,000 | $1,094,000 | $1,810,000 | $2,857,000 |
| Expenses | | | | | |
| Subarea Expenses | $298,000 | $423,000 | $ 800,000 | $1,181,000 | $1,824,000 |
| Internal Sewerage O & M | 47,000 | 69,000 | 104,000 | 222,000 | 365,000 |
| Customer Service | 86,000 | 125,000 | 190,000 | 406,000 | 667,000 |
| Total Expenses | $431,000 | $617,000 | $1,094,000 | $1,809,000 | $2,856,000 |

* Represents the level of charge to finance local benefit improvements. The revenue from this charge is not shown on this table.

TABLE 30
CAPACITY AND COST SHARES
CITY AND NORTH SPOKANE SUBAREA

| City and North Spokane | 1980 | | 1985 | | 1990 | | 1995 | | 2000 | |
|---|---|---|---|---|---|---|---|---|---|---|
| | Flow | % | Flow | % | Flow | % | Flow | % | Flow | % |
| North Spokane-County | 2.05 | 6.3 | 2.38 | 7.0 | 2.97 | 8.2 | 3.65 | 9.6 | 4.44 | 11.1 |
| North Spokane-City | 0.35 | 1.1 | 0.42 | 1.2 | 0.93 | 2.5 | 1.15 | 3.0 | 1.36 | 3.4 |
| City Service Area | 30.00 | 92.6 | 31.40 | 91.8 | 32.40 | 89.3 | 33.40 | 87.4 | 34.20 | 85.5 |
| Totals | 32.40 | 100.0 | 34.20 | 100.0 | 36.30 | 100.0 | 38.20 | 100.0 | 40.00 | 100.0 |

Operating cost shares for treatment and disposal based on above percentage of flows in each year.
Capital cost shares for treatment and disposal facilities based on above year 2000 percentage of flows.

| North Spokane Only | Flow | % | Flow | % | Flow | % | Flow | % | Flow | % |
|---|---|---|---|---|---|---|---|---|---|---|
| North Spokane-County | 2.05 | 85.4 | 2.38 | 85.0 | 2.97 | 76.2 | 3.65 | 76.0 | 4.44 | 76.5 |
| North Spokane-City | 0.35 | 14.6 | 0.42 | 15.0 | 0.93 | 23.8 | 1.15 | 24.0 | 1.36 | 23.5 |
| Totals | 2.40 | 100.0 | 2.80 | 100.0 | 3.90 | 100.0 | 4.80 | 100.0 | 5.80 | 100.0 |

Operating costs for conveyance facilities to City STP based on above percentage of flows in each year.
Capital cost for conveyance facilities to City STP based on year 2000 percentage of flow.

TABLE 31
CAPACITY ALLOCATION OF OPERATING AND CAPITAL COST
CITY AND NORTH SPOKANE SUBAREA

| | Year | | | | |
|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1995 | 2000 |
| **Operating Expenses** | | | | | |
| Treatment Plant | | | | | |
| North Spokane (County) Share | $ 194,000 | $ 296,000 | $ 477,000 | $ 765,000 | $ 1,207,000 |
| City Share | 2,890,000 | 3,932,000 | 5,342,000 | 7,199,000 | 9,663,000 |
| Total | $3,084,000 | $4,228,000 | $5,819,000 | $7,964,000 | $10,870,000 |
| Conveyance Facilities | | | | | |
| North Spokane (County) Share | $ 62,000 | $ 86,000 | $ 143,000 | $ 197,000 | $ 273,000 |
| City Share | 11,000 | 15,000 | 45,000 | 62,000 | 84,000 |
| Total | $ 73,000 | $ 101,000 | $ 188,000 | $ 259,000 | $ 357,000 |
| **Capital Expenses** | | | | | |
| Existing STP | | | | | |
| NS (County) Purchase Capacity[1] | $ 44,000 | $ 44,000 | $ 44,000 | $ 44,000 | $ 44,000 |
| Bond Issues[2] | | | | | |
| 1980 Issue | | | | | |
| NS (County) Share = 75.6% | $ 246,000 | $ 246,000 | $ 246,000 | $ 246,000 | $ 246,000 |
| City Share = 34.4% | 79,000 | 79,000 | 79,000 | 79,000 | 79,000 |
| 1985 Issue | | | | | |
| NS (County) Share = 74.9% | -- | 158,000 | 158,000 | 158,000 | 158,000 |
| City Share - 23.5% | -- | 49,000 | 49,000 | 49,000 | 49,000 |
| 1990 Issue | | | | | |
| NS (County) Share - 74.9% | -- | -- | 634,000 | 634,000 | 634,000 |
| City Share = 35.1% | -- | -- | 212,000 | 212,000 | 212,000 |

1 - Based on 11.1 percent of local share of $4,699,000. Repayment amortized for 25 years at 6.75 percent.
2 - Based on county are of 11.1 percent for STP, 76.5 percent for conveyance, trunks, force mains, and pump stations.

801.4-91

TABLE 32
CITY REVENUES AND EXPENSES CAPACITY COST SHARING
CITY AND NORTH SPOKANE SUBAREA

| | Year | | | | |
|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1995 | 2000 |
| Number of Connections (EDU's) | 67,695, | 68,466 | 70,539 | 71,797 | 73,154 |
| New EDU's (Annual) | 155 | 415 | 250 | 270 | 230 |
| Monthly Service Charge | $5.80 | $7.75 | $10,65 | $13.60 | $17.50 |
| Connection Charge* | | | | | |
| Internal Sewerage Share | $2,305 | $3,315 | $4,760 | $6,820 | $9,800 |
| Treatment Facilities Share | $315 | $405 | $650 | $935 | $1,340 |
| Service Charge - De-Escalated | $3.95 | $3.93 | $4.03 | $3.85 | $3.71 |
| Revenues | | | | | |
| Service Charges | $4,712,000 | $6,367,000 | $9,015,000 | $11,717,000 | $15,362,000 |
| Connection Charges (Treatment) | 49,000 | 187,000 | 163,000 | 252,000 | 308,000 |
| STP Capacity Payments from N.S. | 44,000 | 44,000 | 44,000 | 44,000 | 44,000 |
| Total Revenues | $4,805,000 | $6,598,000 | $9,222,000 | $12,013,000 | $15,714,000 |
| Expenses | | | | | |
| Treatment O & M | $2,890,000 | $3,932,000 | $5,342,000 | $ 7,199,000 | $ 9,663,000 |
| Conveyance O & M | 11,000 | 15,000 | 45,000 | 62,000 | 84,000 |
| Internal Sewerage O & M | 719,000 | 710,000 | 964,000 | 1,309,000 | 1,787,000 |
| Customer Service | 837,000 | 1,136,000 | 1,542,000 | 2,095,000 | 2,859,000 |
| Present Bond Service | 72,000 | -- | -- | -- | -- |
| 1980 Bond Issue (Share) | 79,000 | 79,000 | 79,000 | 79,000 | 79,000 |
| 1985 Bond Issue (Share) | -- | 49,000 | 49,000 | 49,000 | 49,000 |
| 1990 Bond Issue (Share) | -- | -- | 212,000 | 212,000 | 212,000 |
| Bonds for Sewer Corrections | 193,000 | 673,000 | 970,000 | 970,000 | 970,000 |
| Total Expenses | $4,801,000 | $6,594,000 | $9,203,000 | $11,975,000 | $15,703,000 |

* Internal sewerage portion paid as one time charge at time of connection, or donated by developer and added to the price of a new home, or paid through LID assessment financing. Revenue is not shown on this table.

TABLE 33
NORTH SPOKANE (COUNTY) REVENUES AND EXPENSES CAPACITY COST SHARING
CITY AND NORTH SPOKANE SUBSYSTEM

| | Year | | | | |
|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1995 | 2000 |
| Number of Connections | 5,645 | 6,409 | 8,606 | 10,528 | 13,101 |
| New EDU's (Annual) | 120 | 360 | 325 | 430 | 370 |
| Monthly Service Charge | $9.50 | $11.25 | $17.30 | $18.00 | $19.75 |
| Connection Charge | | | | | |
| Internal Sewerage Share* | $1,610 | $2,315 | $3,325 | $4,765 | $6,845 |
| Treatment Facilities Share | $ 315 | $ 450 | $ 650 | $ 935 | $1,340 |
| Service Charge De-Escalated | $6.46 | $5.71 | $6.55 | $5.10 | $4.18 |
| Revenues | | | | | |
| Service Charges | $644,000 | $ 865,000 | $1,787,000 | $2,274,000 | $3,105,000 |
| Connection Charges (Treatment) | 38,000 | 162,000 | 211,000 | 402,000 | 496,000 |
| Total Revenues | $682,000 | $1,027,000 | $1,998,000 | $2,676,000 | $3,601,000 |
| Expenses | | | | | |
| Treatment O & M | $194,000 | $ 296,000 | $ 477,000 | $ 765,000 | $1,207,000 |
| Conveyance O & M | 62,000 | 86,000 | 143,000 | 197,000 | 273,000 |
| Internal Sewerage O & M | 47,000 | 69,000 | 104,000 | 222,000 | 365,000 |
| Customer Service | 86,000 | 125,000 | 190,000 | 406,000 | 667,000 |
| STP Capacity Purchase | 44,000 | 44,000 | 44,000 | 44,000 | 44,000 |
| 1980 Bond Issue (Share) | 246,000 | 246,000 | 246,000 | 246,000 | 246,000 |
| 1985 Bond Issue | -- | 158,000 | 158,000 | 158,000 | 158,000 |
| 1990 Bond Issue | -- | -- | 634,000 | 634,000 | 634,000 |
| Total Expenses | $679,000 | $1,024,000 | $1,996,000 | $2,672,000 | $3,594,000 |

*Paid as a one time charge at time of connection, or donated by developer and added to the price of a new home, or paid through LID assessment financing.. Revenue is not shown on the table.

801.4-96

TABLE 34
SUBAREA REVENUES AND EXPENSES
SPOKANE VALLEY SUBSYSTEM

| | Year | | | | |
|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1995 | 2000 |
| Number of Connections (EDU's) | 20,020 | 22,130 | 24,215 | 26,510 | 28,390 |
| New EDU's (Annual) | 420 | 420 | 460 | 380 | 380 |
| Service Charge (Monthly) | -- | $13.80 | $15.65 | $18.60 | $22.95 |
| Connection Charge (Regional) | -- | $450 | $650 | $935 | $1,340 |
| Connection Charge (Internal)* | -- | $3,425 | $4,915 | $7,040 | $10,120 |
| Service Charge De-Escalated | -- | $7.00 | $5.93 | $5.27 | $4.86 |
| Revenues | | | | | |
| Service Charge | -- | $3,665,000 | $4,548,000 | $5,917,000 | $7,818,000 |
| Connection Charge (Regional) | -- | 189,000 | 299,000 | 355,000 | 509,000 |
| Total Revenues | -- | $3,854,000 | $4,847,000 | $6,272,000 | $8,328,000 |
| Expenses | | | | | |
| Treatment Plant and Outfall M&O | -- | $1,314,000 | $1,827,000 | $2,517,000 | $3,597,000 |
| Internal Sewerage M&O | -- | 165,000 | 246,000 | 371,000 | 604,000 |
| Customer Service | -- | 301,000 | 446,000 | 678,000 | 1,104,000 |
| Equalization Compensation | -- | 900 | 800 | 700 | 600 |
| Bond Service | -- | 2,062,000 | 2,313,000 | 2,698,000 | 3,013,000 |
| Total Expenses | -- | $3,842,900 | $4,832,800 | $6,264,700 | $8,318,600 |

* Represents the level of charge to finance local benefit improvements. The revenue from this charge is not shown on this table.

801.4-97

TABLE 35
INITIAL YEAR FINANCING OF LOCAL BENEFIT SEWER
UTILITY IMPROVEMENT DISTRICTS

North Spokane Subsystem
Internal Sewerage Facilities

| Year | Escalated Cost | Number of EDU's | Average Cost per EDU |
|---|---|---|---|
| 1980 | $10,878,000 | 6,600 | $1,648 |

Assessment Bonds

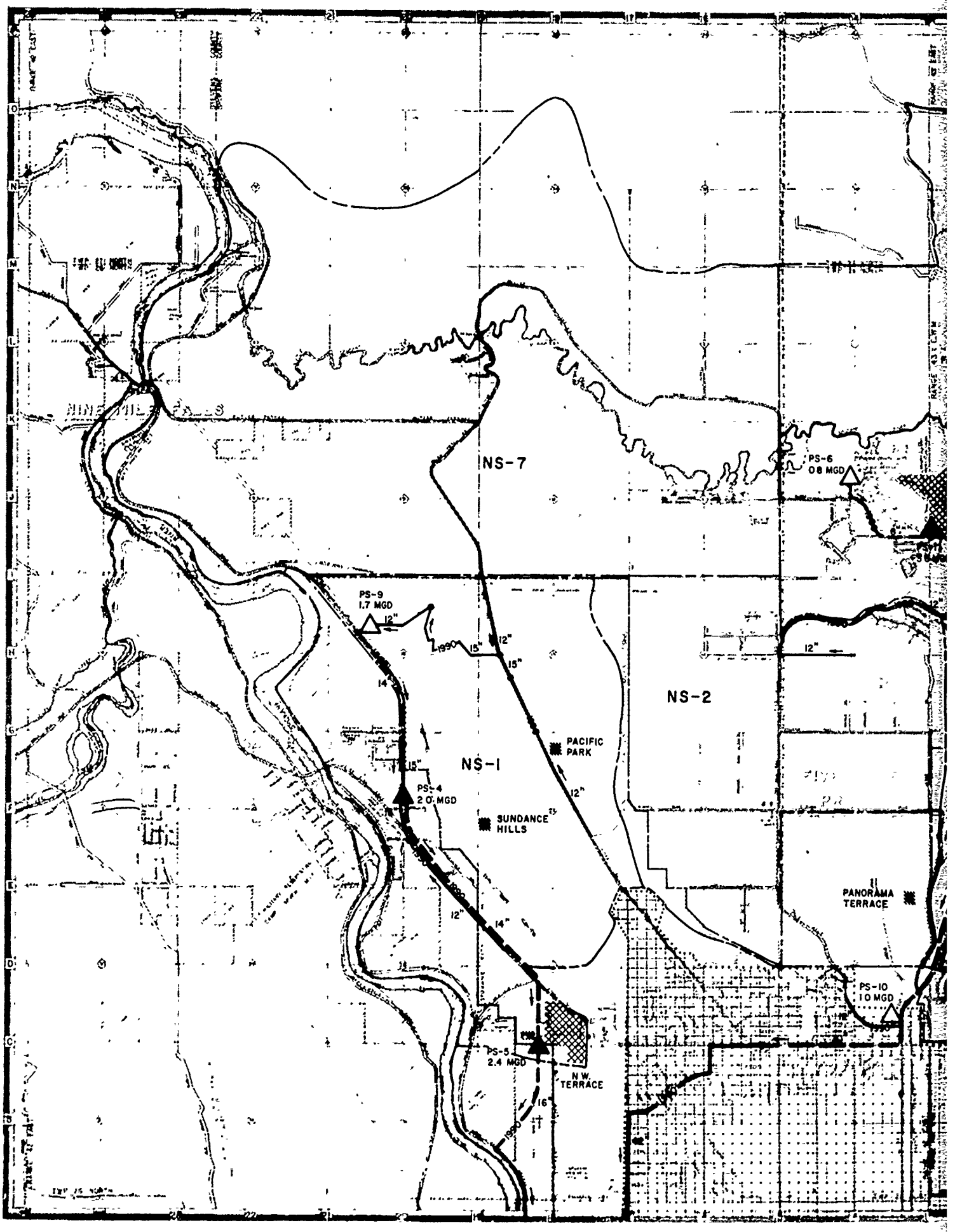
| | |
|---|---|
| Principal Amount | $10,900,000 |
| Estimated Interest | 8% |
| Life | 20 years |
| Average Annual Bond Svc. | $1,110,000 |
| Average Annual Payment/EDU | $168 |

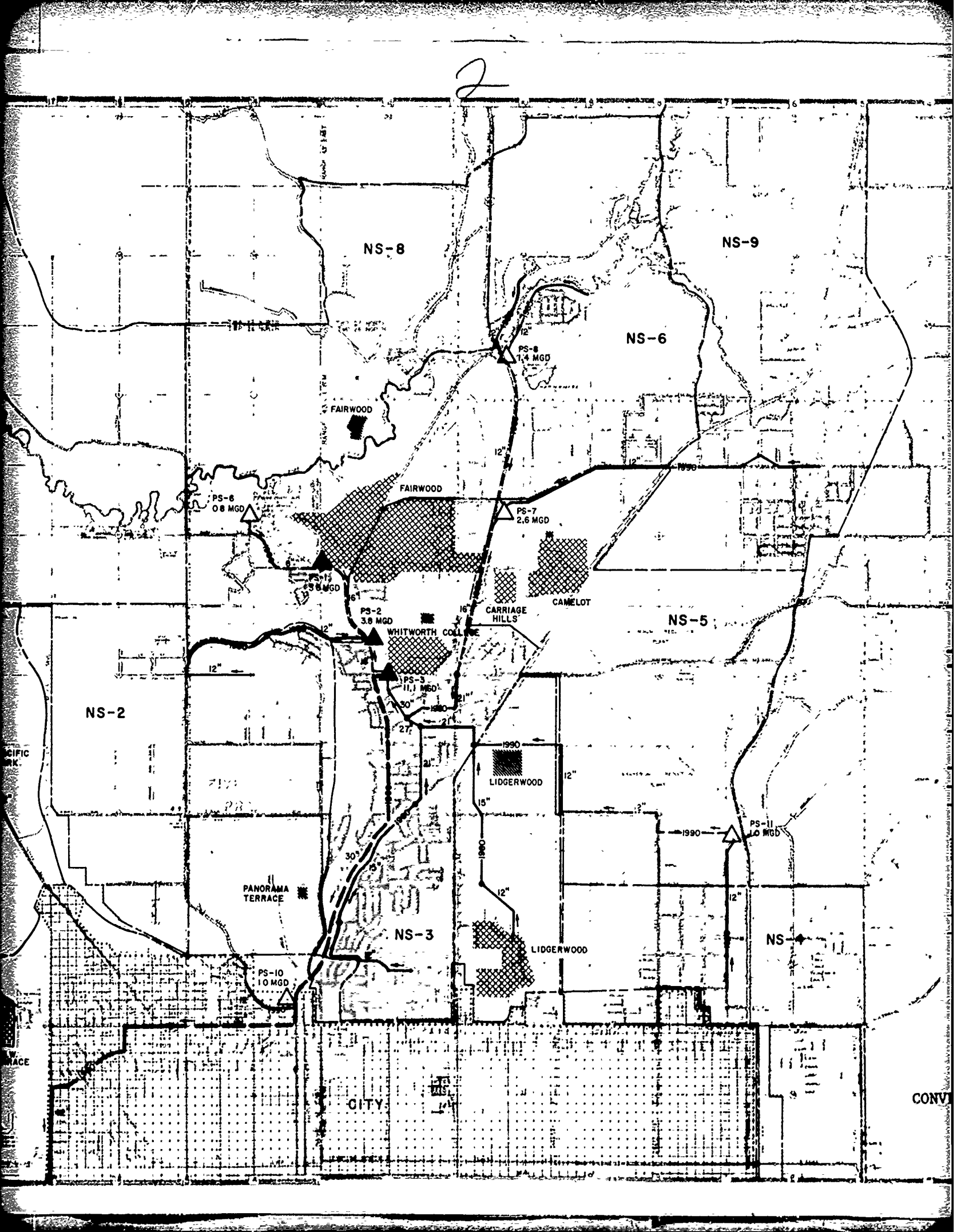
Spokane Valley Subsystem

| Year | Escalated Cost | Number of EDU's | Average Cost per EDU |
|---|---|---|---|
| 1985 | $73,663,000 | 20,020 | $3,679 |

Assessment Bonds

| | |
|---|---|
| Principal Amount | $74,000,000 |
| Estimated Interest Rate | 8% |
| Life | 20 years |
| Average Annual Bond Svc. | $7,537,000 |
| Average Annual Payment/EDU | $376 |


NS-7
NS-2
NS-1
PS-6
0.8 MGD
PS-9
1.7 MGD
PS-4
2.0 MGD
PS-5
2.4 MGD
PS-10
1.0 MGD
PACIFIC
PARK
SUNDANCE
HILLS
PANORAMA
TERRACE
N.W.
TERRACE
12"
14"
15"
16"
1990


NS-8
NS-9
NS-6
NS-5
NS-2
NS-3
NS
FAIRWOOD
PS-8
7.4 MGD
PS-6
0.8 MGD
PS-7
2.6 MGD
PS-1
0.8 MGD
PS-2
3.8 MGD
WHITWORTH COLLEGE
CARRIAGE HILLS
CAMELOT
PS-3
11.1 MGD
LIDGERWOOD
PS-11
1.0 MGD
PANORAMA TERRACE
PS-10
1.0 MGD
CITY
1990
1980
12"
15"
16"
21"
27"
30"

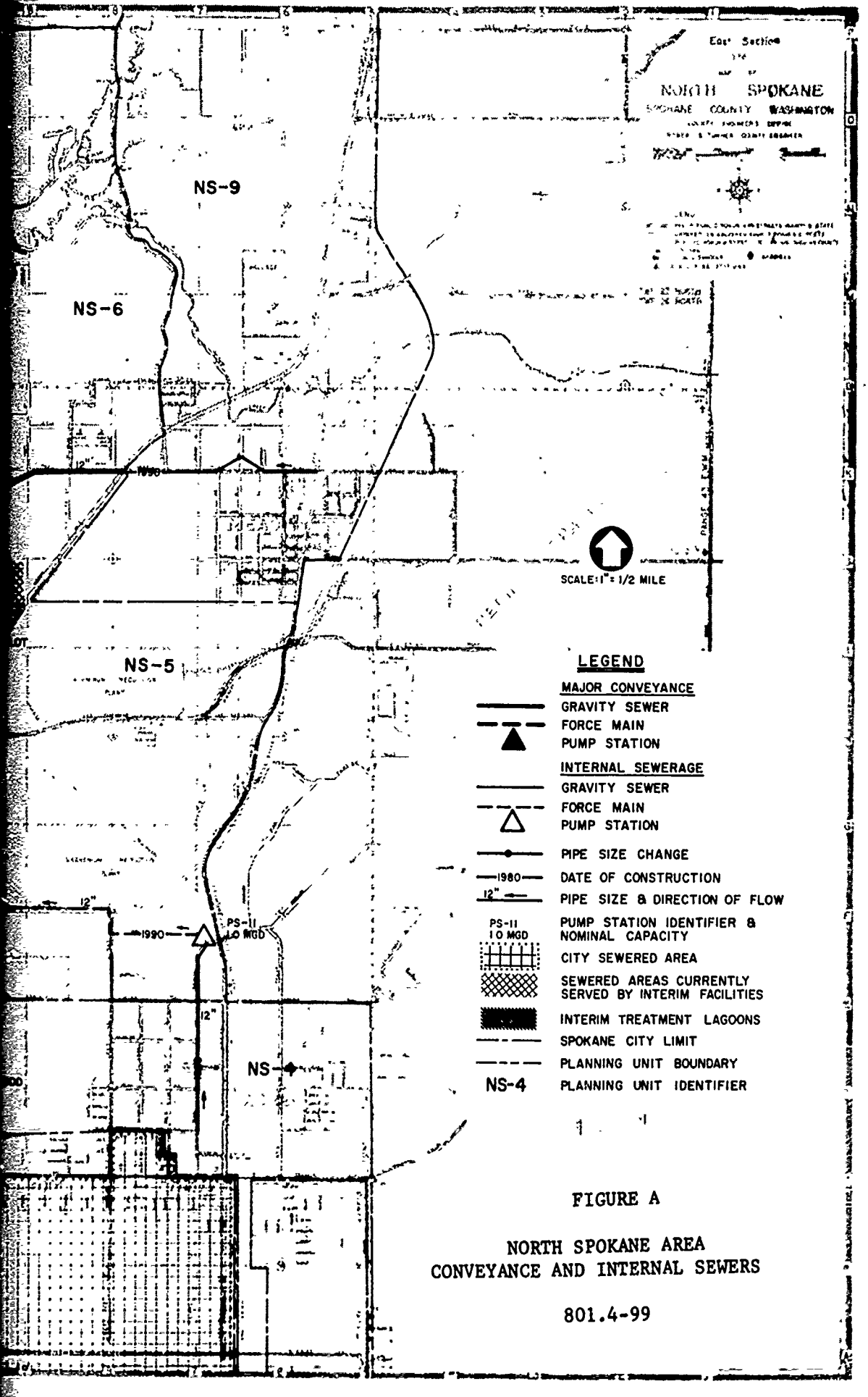
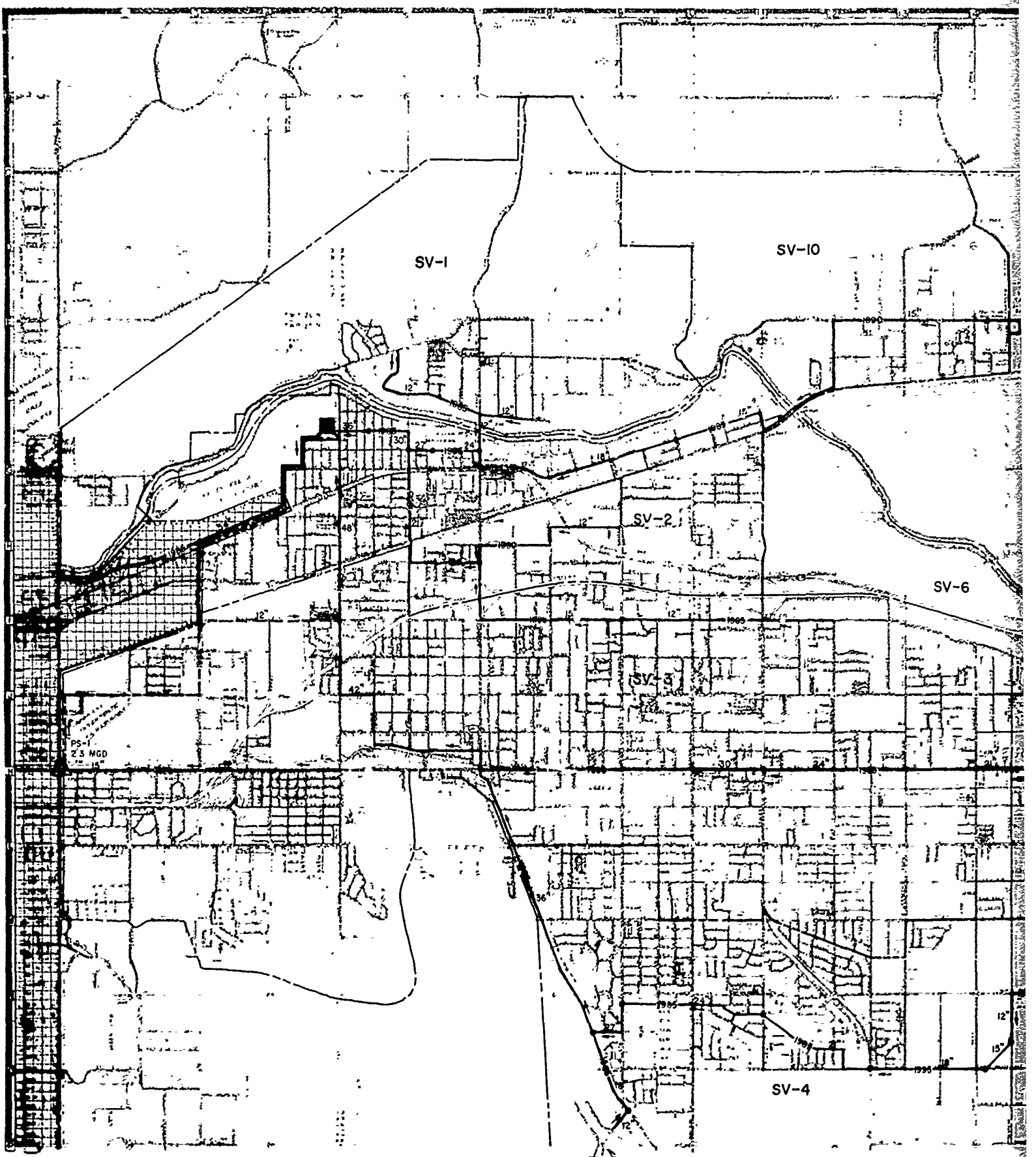


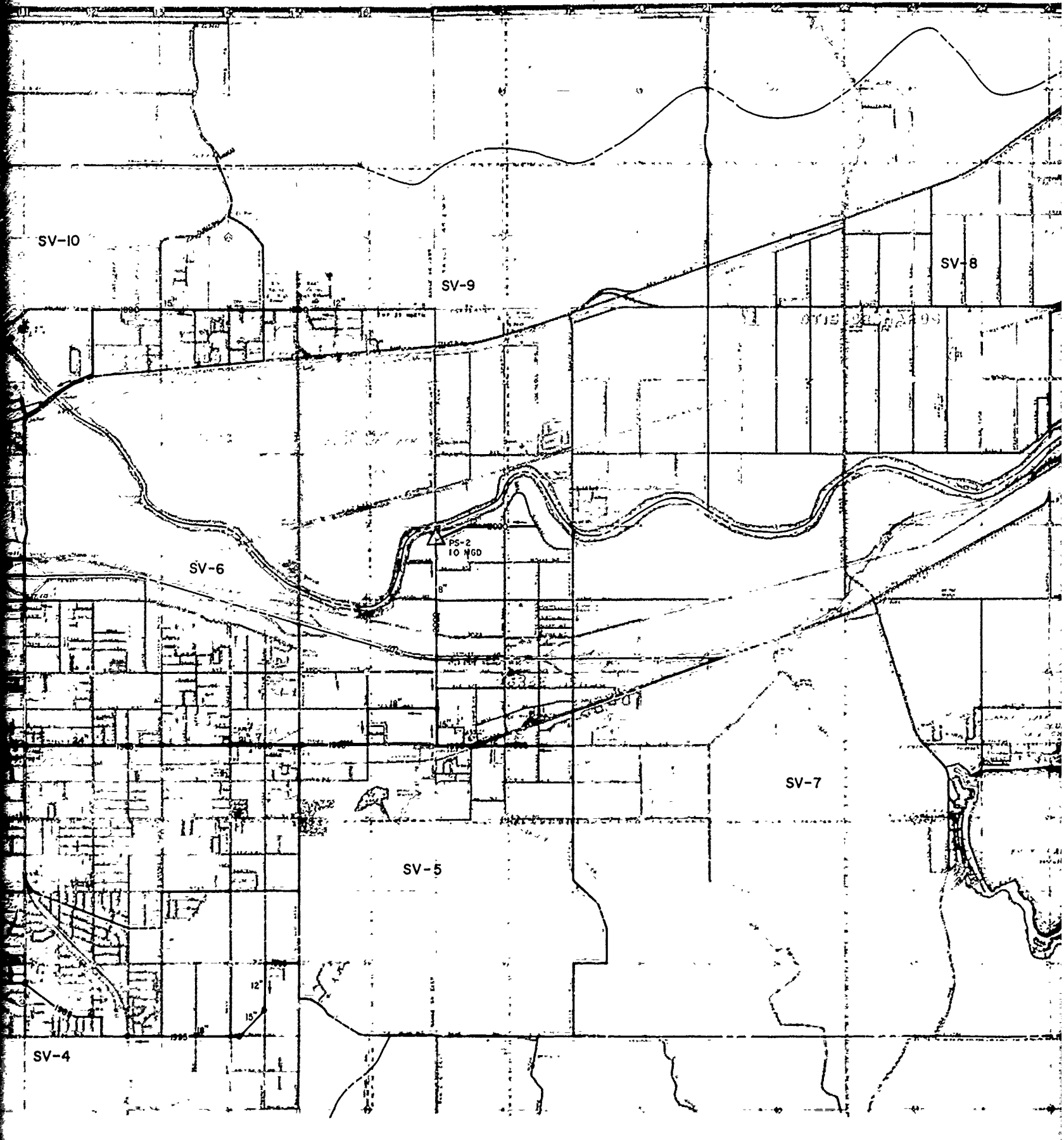

FIGURE A

NORTH SPOKANE AREA
CONVEYANCE AND INTERNAL SEWERS

801.4-99


SV-1
SV-10
SV-2
SV-6
SV-3
SV-4
PS-1
2.5 MGD

2



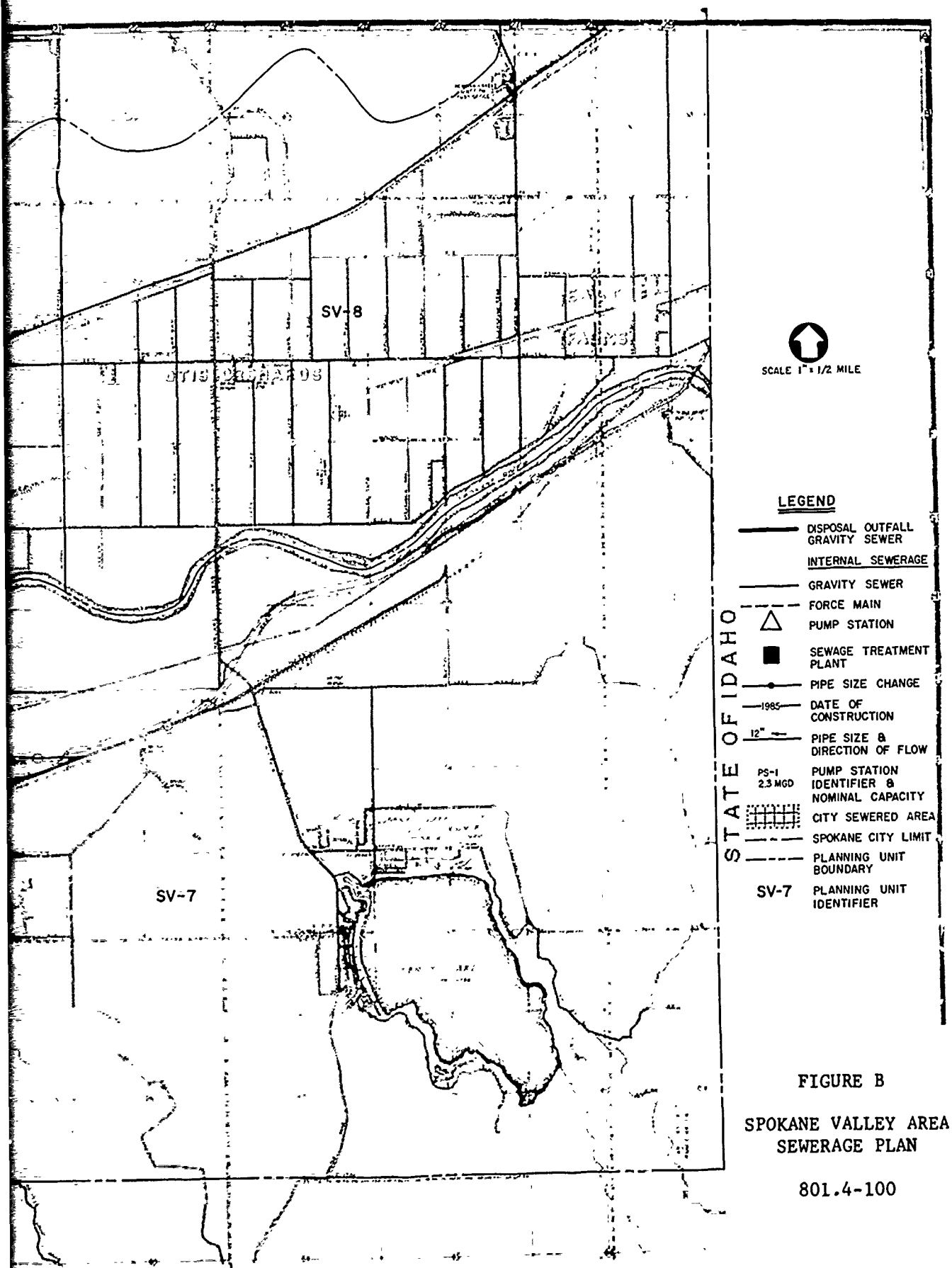
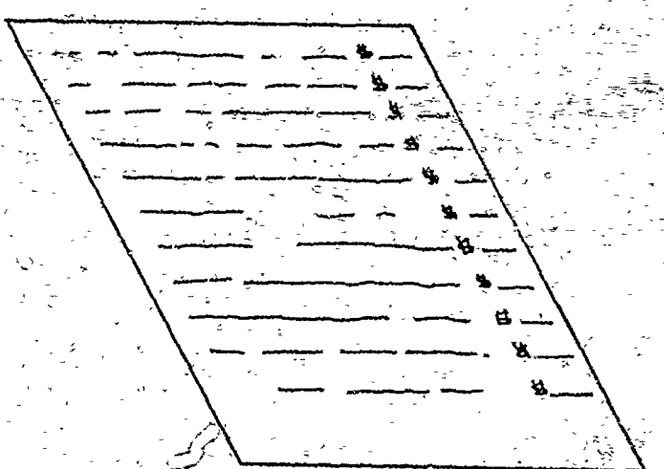



FIGURE B

SPOKANE VALLEY AREA
SEWERAGE PLAN

801.4-100



# SECTION 204.1

## COST ESTIMATES FOR FINANCIAL PLANNING

# WATER RESOURCES STUDY

# METROPOLITAN SPOKANE REGION

## SECTION 704.1

## COST ESTIMATES FOR

## FINANCIAL PLANNING

22 July 1975

Department of the Army, Seattle District
Corps of Engineers
Kennedy-Tudor Consulting Engineers

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SECTION 704.1

# COST ESTIMATES FOR FINANCIAL PLANNING

## Objectives

The objectives of this section are to develop cost estimates for elements of the recommended plan in a form suitable for formulation of a financial plan. Costs to be included are both capital and operation and maintenance costs. Capital costs are to be project costs and are to be associated with service lives so that capital recovery costs may be computed. Operation and maintenance costs are to be mean annual costs including the impact of infrequently occurring major maintenance items.

## Price Level

All costs are at mid-1974 level as previously developed for cost effectiveness analysis. Recognition of inflationary trends is to be incorporated in the financial plan but is specifically excluded from the presentation in this section.

## The Selected Plan

General. The plan selected for formulation of a financial plan is wastewater alternative Plan A. Plan A consists of two separate subsystems. One subsystem serves the City of Spokane and North Spokane with treatment at the City STP. The other subsystem serves Spokane Valley with treatment at a separate plant located near Felts Field. Both treatment plants are to provide secondary treatment to 1983

standards plus year around phosphorus removal for disposal to the Spokane River. Both plants are to include provision for sludge processing and disposal in accordance with alternative Plan S, anaerobic digestion, vacuum filtration and sanitary landfill.

Subsystem for City and North Spokane. The subsystem serving the City and North Spokane utilizes the committed expansion and upgrading of the City STP which includes secondary treatment to 1983 standards, facilities for full time phosphorus removal and sludge processing facilities consisting of anaerobic digestion vacuum filtration and sanitary landfill. That is, the committed City facility has all the required elements for Plan A. Furthermore, the capacity at 40 mgd is adequate for the forecast flows from the combined service areas of City and North Spokane to year 2000. No additional capital expenditure for treatment facilities for this subsystem is required over that which already exists as a sunk cost except to implement possible modifications for features such as seasonal nitrification or dechlorination.

The other elements of the subsystem serving the City and North Spokane under Plan A are as follows:

1. Collection systems, City Service Area.
    a. The existing collection system
    b. Expansions to the existing system to serve growth during the planning period.
    c. Rehabilitation of the existing system to solve the problems of combined sewer overflow and local flooding.

2. Collection systems, North Spokane Service Area

   a. Existing City systems tributary to interim facilities

   b. Existing County areas systems tributary to interim facilities

   c. New systems to be built in City areas to serve existing structures presently served by on-site disposal facilities.

   d. New systems to be built in County areas to serve existing structures presently served by on-site disposal facilities.

   e. New systems to be built in City areas to serve growth during the planning.

   f. New systems to be built in County areas to serve growth during the planning period.

3. Existing interim facilities, North Spokane Service Area

   a. Serving City areas

      (1) Cozza-Calkins (Lidgerwood)

      (2) Panorama Terrace

      (3) Northwest Terrace

      (4) Sundance Hills

      (5) Pacific Park

   b. Serving County areas

      (1) Fairwood

      (2) Whitworth College

      (3) Camelot-Carriage Hills

4. Conveyance Facilities for North Spokane Service Area

   a. Initial construction to implement plan

   b. Stage construction to gather other areas as growth makes feasible.

It is the purpose of this section to provide cost estimates for all of the above that involve future construction except Item 1-c, rehabilitation of the existing City system to solve combined sewer overflow and local flooding, which is to be adopted from the City plan of study.

Dwellings and other structures presently served by on-site disposal will have costs associated with abandonment of the on-site facilities and altering existing plumbing to connect to the sewer house lateral. These costs which accrue to the individual owner are not included in the financial plan of the implementing public agency and are not included herein. These costs, nevertheless, are as real to each owner as his share assessed by the implementing public agency and are to be pointed out in the financial plan as one of the costs each owner must consider.

Subsystem for Spokane Valley. There are essentially no existing facilities that become elements of a permanent system for the Spokane Valley. The required elements of the subsystem are as follows:

1. Treatment facility to provide secondary treatment and full time phosphorus removal complete with solids processing consisting of anaerobic digestion, vacuum filtration

and sanitary landfill.

2. An outfall sewer from the treatment plant site to a location approximately 11,000 feet downstream.

3. A sanitary sewage collection system:

   a. To connect existing structures at the time of implementation which are presently served by on-site disposal.

   b. To serve structures added after initial implementation throughout the planning period.

It is the purpose of this section to provide cost estimates for all of the above items. As pointed out above under the City-North Spokane subsystem, there will be additional costs to individuals for alteration of existing plumbing to connect to the community sewerage system that are not included herein.

The community of Liberty Lake is feasibly connected to the Spokane Valley collection system after the trunk extension scheduled in 1995. The community of Liberty Lake will have been providing separate treatment and disposal in accordance with current planning. The need for incorporation into the Spokane Valley system in 1995 cannot be firmly established at this time. Incorporation of Liberty Lake into the Spokane Valley system will not make a significant difference in the trunk system, treatment plant or outfall sizing and cost since the increment to total service population is only 2 percent. Therefore, the financial plan for Spokane Valley exclusive of Liberty Lake will be substantially unchanged whether Liberty Lake joins the system or not.

In the event that connection is elected, a separate financial plan would be required for Liberty Lake in 1995 to construct a connection to Spokane Valley and acquire a share in the use of Spokane Valley facilities. The tables herein do not include separable costs for Liberty Lake.

Implementation Schedules

For the City-North Spokane subsystem where the treatment plant is already under construction and the need for immediate sewerage in the North Spokane area is generally recognized and accepted, the schedule is based on immediate action. An implementation schedule leading to initial service to North Spokane in 1980 is shown in Table 1.

For the Spokane Valley the decision process is expected to preclude early action. If a decision is reached to proceed with a community sewage collection system it is estimated that implementation will not start until 1980 with initial service in 1985. An implementation schedule based on this assumption is shown in Table 2.

The service populations for the Spokane Valley by years is more a function of the number of feasibly sewered structures and the rate at which new structures will fill in or extend from an established sewer system than on the total population. It is judged therefore that the initial service population in 1985 would not be substantially different than that previously estimated for 1980 based on existing housing patterns. Therefore, the service populations for a 20 year planning period delayed 5 years to 1985 are assumed to be substantially equal to that previously developed beginning in 1980 for cost effectiveness analysis.

Capital Costs, General

Capital costs are developed as project costs. Project costs are defined as construction cost plus engineering, owners overhead and contingency in the amount of 40 percent of construction cost and at 25 percent of acquisition cost for land. Refer to Section 401.1 for details.

The year given for a capital expenditure is the year the facility goes into service. Recognition of stage expenditure prior to service date is not included herein. Service population and flow forecasts for the two subsystems are shown in Tables 3 and 4.

Operation and Maintenance Costs, General

Operation and maintenance costs are developed for both existing facilities (for which capital cost are "sunk") and facilities constructed as part of the implementation plan. The costs are mean annual costs in which long-term infrequently occurring maintenance charges are spread uniformly.

For both the City STP and Spokane Valley STP year around phosphorus removal is included to conform with current DOE directives. The difference in cost between year around and seasonal removal is so significant that the difference is developed for discussion purposes.

Other significant elements of the total cost of sewerage service in addition to maintenance and operation of the physical facilities are those costs associated with providing and billing customer service.

Capital Costs, City STP

The City STP after committed expansion and upgrading will have an average dry weather capacity of 40 mgd and will be complete with facilities for phosphorus removal and sludge disposal. Since the forecast flow for the combined City and North Spokane areas is 40.05 mgd at year 2000, there is no need for capital expenditure within the planning period for additions to the process elements provided.

The committed expansion and upgrading does not provide facilities for removal or conversion of ammonia if needed to forestall ammonia toxicity in the receiving waters. For brief periods when low flow makes this need a critical possibility, the required nitrification could be achieved by reduction of load on the activated sludge reactor by moving the chemical coagulation to the primary. Additional aeration capacity may be required in this case to carry nitrification to the necessary level.

Other contingent needs for additions to the plant are reaeration to raise the dissolved oxygen level of the effluent and dechlorination to remove chlorine residual from the effluent.

To provide for these contingent possibilities, capital project cost items of $300,000 in 1980 and $700,000 in 1990 are included without identification of a specific facility to be constructed. This, in effect, is equal to providing a 10 percent contingency, in two steps, on the sunk cost item.

The estimated remaining life of the Indian Trails landfill site which is presently receiving the dewatered sludge from the City STP is 10 to 15 years. An item of future capital cost will be additional land for sanitary landfill. This cost is based on an area of 160 acres required from 1990 to year 2000. The required area utilized in the existing landfill site, which is a sunk cost, is 144 acres for the 1980 to 1990 period.

Capital Costs, Conveyance of North Spokane Area Flows to City STP

The conveyance plan for the North Spokane Area is shown in Figure A. This plan is a refinement of the plan used in cost effectiveness analysis and utilizes a route south of Five Mile Prairie in lieu of a route around the north and west of Five Mile Prairie. The refined route eliminates some difficult construction, greatly reduces the pumping head and provides an opportunity to combine a part of this work with a needed relief sewer in the City.

The conveyance facilities are planned to be constructed in two stages. The first stage, to be accomplished for 1980 implementation, provides all the basic facilities to serve the North Spokane Area east of Five Mile Prairie. The second stage, to be placed in service in 1990, provides facilities to convey wastewaters from the area west of Five Mile Prairie.

The cost estimates for these two steps of conveyance construction are shown in Appendices I and II and summarized in Table 5.

Capital Costs, Internal Sewerage, North Spokane Area

A preliminary plan for internal sewerage of the North Spokane Area is developed and shown in Figure A. The collection system is designed to be compatible with the conveyance system. The collection system is staged to gather up the most intensively built up areas first and then extend into the area forecast to develop later. Figure A shows sewers 10 inch and larger only. All other collection sewers are 8 inch minimum size.

Cost estimates for the 10 inch and larger sewers are based on measured quantities from the layout shown in Figure A. The cost of 8 inch sewers is based on an average length per capita required to serve development of typical forecast density. Refer to Appendix XVII. Cost estimates are shown in Appendix III and are summarized in Table 5. A significant number of existing dwellings and other structures are served by sewage collection systems associated with interim facilities. The cost of these existing sewers is not included in Appendix III or the summarized costs in Table 5. The historical cost of these existing sewers is not known. Their cost on the same basis as new construction is estimated at $1,600,000 (including side sewers) serving the 5646 persons incorporated into the community system in 1980. The cost of the sewers serving the 1060 persons still served by interim facilities in 1980 is estimated to be $300,000 on the same basis.

The internal sewerage system for North Spokane involves a number of pump stations. These are estimated on the basis of stations with full standby for continuity of operation.

Internal sewerage costs as shown in Appendix III and summarized on Table 5 include the cost of side sewers, that is the extension from the street sewer to the property line of each customer. The costs to the individual customer of connecting structure plumbing to the side sewer at the property line is not included. This later cost is highly variable depending upon the siting of the individual structure and whether the structure is new construction with plumbing oriented toward a street sewer or an existing structure with plumbing oriented toward a septic tank in a rear or side yard. The cost of plumbing on the individual customers property is not evaluated herein but is pointed out as a significant cost to be born by the individual customer in addition to his share of the publicly owned sewers.

Where the dwellings already exist there is no question that all of the required internal sewerage will be a direct cost to the agency providing the sewerage service. For future customers, the allocation of the cost between the developer or customer and the sewerage agency becomes difficult to define. Where the new customer is an individual the sewer extension and side sewers are constructed by the sewerage agency with costs all or in part offset by a connection charge. For larger developments, the developer constructs the collection system and side sewers and the agency constructs any major extension all or part of which is offset by the connection charge. The cost estimates herein for internal sewerage to serve future customers include costs of all sewers and side sewers necessary to make collection possible regardless of who actually constructs them or how they are paid for.

Capital Costs, Internal Sewerage, City Service Area

There are two elements of future expense relative to internal sewerage for the City. The first is construction of new sewers and side sewers to serve growth in the City area. The second is revisions to the existing combined sewerage system to correct combined sewerage overflows and local flooding.

Since the City growth in population will be in the form of filling in on the routes of existing sewers plus some building in new areas, estimation of the costs of sewer additions requires that some assumptions be made as to the proportions of the various kinds of growth. Approximately 55 percent of the forecast City service area growth is in developed areas and 45 percent in lightly developed or undeveloped areas. It is estimated that half the growth in the developed area will not require sewer extensions and that half of the new side sewers will be to multiple unit structures where the average side sewer would serve 50 persons. In the other half of the developed area and in all the lightly and undeveloped areas, it is assumed that sewer extensions and side sewers are needed in proportion to growth. The resultant estimate is shown in Appendix IV and summarized in Table 5.

The program for correction of combined overflows and local flooding proposed in the City Plan of Study submitted to DOE September 1974 extends over a period of eleven years from 1975 through 1986. The projected work consists of nine projects of average construction cost 5 million dollars each. One project is scheduled for construction prior to 1980. For the purpose of indicating a probable schedule of demand

for funds, it is assumed that one 5 million dollar project would be completed prior to 1980 and that the eight remaining projects would be completed at the rate of one per year averaging 5 million dollars each 1980 through 1987. The estimated costs, converted to project costs by the addition of 40 percent are summarized in Table 5.

Operation and Maintenance Cost, City-North Spokane Subsystem

Sewage Collection System O&M and Customer Service. National average values for these two annual cost elements are developed by Smith and Eilers (1970) on a per capita basis. Adjusted to 1974 price levels the Smith and Eilers results are as follows:

| | Annual cost, dollars per capita per year |
|---|---|
| Operation and maintenance of the collection system | $1.32 |
| Customer service and accounting | 1.09 |
| General and administration | 2.11 |
| Total | $4.52 |

The 1973 budget experience for the City of Spokane for comparison gives the following approximations:

| | Annual cost, dollars per capita per year |
|---|---|
| O&M collection system | $2.35 |
| Customer service and accounting | 1.60 |
| General and administrative* | 1.60 |
| Total | $5.55 |

*Designated "taxes" in the City budget representing transfer of monies to the general fund.

The City O&M experience is undoubtedly on the high side of the average due to the problems associated with the combined sewer system and existing system deficiencies. These costs are forecast by the City to go higher to about $2.80. For City sewers, $2.75 is selected for estimating purposes, reducing to $2.00 at 1985 after system corrections are accomplished. For new areas with separated sewers, $1.75 is selected since there is a longer per capita sewer length for areas in this study than the national average.

The actual allocated general and administrative expense may not be identifiable from the City budget. Likewise it is not known whether the split between customer service and accounting and general administration as shown in Smith and Eilers is on a corresponding basis. The sum of these two elements from both Smith and Eilers and the City are in substantial agreement being about $3.20 per capita per year. This value is adopted for this study.

Annual costs for the North Spokane and City service areas for internal sewerage O&M and for customer service, including administration, are developed in Appendix V and are summarized in Table 6.

Conveyance Facilities. Operation and maintenance costs for conveyance facilities to deliver wastewater from the North Spokane area to the City STP are developed in Appendix VI and summarized in Table 6. The costs shown at five year intervals are the average costs in the named year and the variable component, due primarily to increased

pumping costs is shown as an annual increase per year to be added to each base year to arrive at the total cost for an intervening year.

City Treatment Facilities. Operation and maintenance costs for the committed City STP handling the combined flows of the City and North Spokane are developed in Appendix VII and summarized in Table 6. The costs as developed with criteria from Section 401.2 are approximately 40 percent higher than costs developed by the City's consultant for first year budget. A part of this difference may be due to the fact that the curves in Section 401.2 have long term maintenance items which will occur as large amounts in single future year spread evenly over the entire operating life. The more conservative cost level is judged appropriate for financial planning.

## Capital Costs, Spokane Valley Subsystem

Capital cost elements for the Spokane Valley subsystem consist only of the treatment plant and its outfall and the sewage collection system. Costs are developed in Appendices IX and X and are summarized in Table 7. As previously discussed under cost effectiveness analysis, the forecast flow increase from 7.0 mgd at initial operation to 10.0 mgd at the end of 20 years does not justify stage construction.

The preliminary plan for internal sewerage of the Spokane Valley is shown in Figure B. The incremental expansion of the trunk system is based on an evaluation of the present housing density and the forecast increase by years. The initial service area is based on the housing density and configuration and takes in as much contiguous area

as possible without developing excessive length per unit of housing. Other considerations such as the amount of the community to be in a state of disruption at any one time may reduce the initial construction increment and spread it over several years. The cost estimate herein does not consider this limitation but it may well be considered in financial planning.

Internal sewerage costs for Spokane Valley are on the same basis described above for North Spokane and include side sewers. The cost of plumbing revisions or sewer connection lines on the property of the customer are not included. There are no significant amounts of existing sewage collection systems to interim facilities in the Spokane Valley except in the Town of Millwood. Refer to Appendix XVII for development of the internal sewerage system.

Operation and Maintenance Costs, Spokane Valley Subsystem

The unit costs used to develop sewage collection system operation and maintenance costs and customers service are as developed for the North Spokane system above and are applied in Appendix XI and summarized in Table 8.

Operation and maintenance costs for the treatment plant and outfall are developed in Appendix XII from data from Section 401.2. Results are summarized in Table 8. As for the City STP, these costs are for full time phosphorus removal.

## Possible Financial Effect of Seasonal Phosphorus Removal

The operation and maintenance costs for both the City STP in Table 6 and the Spokane Valley STP in Table 8 are based on year around phosphorus removal in accordance with current DOE direction. The cost of chemicals for year around phosphorus removal are very large. In 1980 at a flow of 32.4 mgd, the cost for chemicals at the City STP is estimated to be $597,000 for year around phosphorus removal. By year 2000, when flow reaches 40 mgd, the chemical cost will be $737,000 per year. Refer to Appendix VII and Appendix XII for details of chemical cost for the City and Spokane Valley STP respectively.

It is possible that either simulation modeling or full scale field testing will determine that less than year around phosphorus removal will provide the desired water quality conditions in Long Lake. If this proves to be feasible, significant reductions in chemical costs for phosphate removal could result. If seasonal removal for a period May 1 through October 15, five and one half months, proves satisfactory, the annual cost will be only 46 percent of year around costs. The annual reduction for the City STP in 1980 would be from $597,000 to $274,000 and for the Spokane Valley STP the annual reduction at 1985 would be from $129,000 to $59,000. The difference in cost at five year intervals is shown in Appendices VII and XII.

The present worth of the average annual difference between seasonal and year-around for the City STP of $350,000 over a twenty year planning period is $3,700,000.

Potential Impact of Future Upgrade to Infiltration-Percolation Disposal

If disposal standards are invoked that are comparable to interpreted standards to meet the 1985 goals of PL 92-500, as described in Section 312, upgrading of both the City STP and the Spokane STP would be required. Cost effectiveness analysis and economic, social and environmental evaluation have demonstrated that Plan D is a favorable choice for the required upgrading. Plan D provides for infiltration-percolation disposal to replace surface water disposal of Plan A for both the City-North Spokane and the Spokane Valley subsystems. Plan D is compatible with Plan A in that it utilizes the Plan A facilities and adds to them. It has been postulated that it is unlikely that a national effort beyond the 1983 standards of PL 92-500 would take place before 1990. The subject of this paragraph is the determination of the financial impact of upgrading Plan A facilities to Plan D facilities in 1990.

For the City STP, the infiltration-percolation site is on a terrace on the north side of Long Lake. The capital additions to the City STP facilities therefore include effluent pumping facilities and approximately 12.6 miles of transmission main in addition to the infiltration ponds themselves. The construction cost of the conveyance facilities and the infiltration ponds is estimated to be $18,400,000 with a project cost of $25,600,000. Refer to Appendix XIII. No additions to the treatment plant itself are required since it has been assumed that denitrification will not be required at this specific infiltration-percolation site since access to the receiving aquifer is limited.

The forecast operation and maintenance costs in 1990 of the

City STP with added facilities for infiltration-percolation disposal are $1,900,000 per year. Refer to Appendix XIV. This is less than the forecast O&M cost in 1990 with Plan A facilities for surface water disposal at $2,200,000 per year. The reason for the reduction is elimination of the need for year around phosphorus removal with its 1990 chemical costs of $670,000 which more than offsets the added costs of O&M for added conveyance and ponds under Plan D.

For the Spokane Valley STP, the infiltration-percolation site is on the downstream end of the aquifer as it approaches the Little Spokane River in the North Spokane area. The access to the aquifer downstream from the disposal site cannot be completely limited or controlled and it is assumed that denitrification will be required. Therefore, the added facilities required include in addition to conveyance to the disposal site and the application ponds, the addition of nitrification-denitrification facilities to the treatment plant. The conveyance distance is approximately 10.2 miles. The estimated construction cost for the conveyance facilities and infiltration-percolation ponds is $7,800,000. The estimated construction cost of the nitrification-denitrification facilities is $3,400,000. Refer to Appendix XV. Total estimated construction cost of additions is $11,200,000 for a project cost of $15,700,000.

Plan D impact on the Spokane Valley STP is proportionately much more severe than on the City STP. The long conveyance and the need for nitrification-denitrification are disadvantageous. At present, the cost of advanced treatment and surface water disposal to interpreted

1985 standards is only slightly more costly than the infiltration-percolation plan. Any significant reduction in the future cost of advanced processes, particularly carbon adsorption, could make the surface water alternative more attractive for Spokane Valley. The important point is, that if more severe standards are imposed by 1990, the magnitude of the costs as estimated would be applicable to either alternative.

The forecast operation and maintenance costs in 1990 of the upgraded Spokane Valley STP plus conveyance and ponds are $891,000 per year. Refer to Appendix XVI. Unlike the case for the City STP, these costs are significantly higher than the costs under Plan A conditions at $690,000. In this case the elimination of the costs for phosphorus removal chemicals at $144,000 per year is more than offset by the addition of nitrification-denitrification at $220,000 per year.

Service Lives

Guidelines for service lives for cost effectiveness are given in Federal Register Vol. 38 No. 174 September 10, 1973 as follows:

> (7) Service life.-The service life of treatment works for a cost-effectiveness analysis shall be as follows:
>
> | Land | Permanent |
> |---|---|
> | Structures (includes plant buildings, concrete process tankage, basins, etc.; sewage collection and conveyance pipelines; lift station structures; tunnels; outfalls) | 30-50 years |

| | |
|---|---|
| Process equipment (includes major process equipment such as clarifier mechanism, vacuum filters, etc.; steel process tankage and chemical storage facilities; electrical generating facilities on standby service only) | 15-30 years |
| Auxiliary equipment (includes instruments and control facilities; sewage pumps and electric motors; mechanical equipment such as compressors, aeration systems, centrifuges, chlorinators, etc.; electrical generating facilities on regular service) | 10-15 years |

For financial planning these guidelines are considered equally appropriate. The selected values are shown below with the proportion of the three classes in overall cost figure.

| | | |
|---|---|---|
| Sewers and Force Mains | 40 years | |
| Pump Stations | 50% - 30 years | 50% - 15 years |
| Treatment Plants | 50% - 30 years | 50% - 15 years |

TABLE I

IMPLEMENTATION SCHEDULE FOR
SERVING NORTH SPOKANE UNDER PLAN A

| Date | |
|---|---|
| 1 Jan 1976 | Decision to begin implementation. |
| 1 May 1976 | Formalize basis for institutional arrangements. |
| 1 June 1976 | Award engineering design contract. |
| 1 July 1976 | Begin predesign engineering. |
| 1 Jan 1977 | Begin final design, acquire lands and R/W. |
| 1 Feb 1978 | Complete plans and specs. and receive grant ok's. |
| 1 March 1978 | Advertise for bids. |
| 1 April 1978 | Receive bids. |
| 1 May 1978 | Award construction contracts. |
| 1 June 1978 | Start construction of conveyance system, trunks and collection system. |
| 1 June 1980 | All conveyance from North Spokane to City STP complete and 70 percent of trunks and collection system. |
| 1 July 1980 | Divert Lidgerwood and Fairwood systems into completed trunk and conveyance system to begin delivery of raw sewage to City STP. Begin transferring individuals from septic tanks to collection system. |
| 31 Oct 1980 | Seventy percent of individuals transferred from septic tank dispoal to collection system. |
| 30 June 1981 | Last individual transferred from septic tank disposal to collection system. |

TABLE 2

IMPLEMENTATION SCHEDULE
SPOKANE VALLEY

| Date | |
|---|---|
| 1 Jan 1980 | Decision to begin implementation. |
| 1 May 1980 | Formalize institutional arrangements. |
| 1 June 1980 | Award engineering contract. |
| 1 July 1980 | Begin predesign engineering. |
| 1 Jan 1981 | Begin final design engineering, acquire lands and R/W. |
| 1 Oct 1981 | Complete first increment of construction plans. |
| 1 Mar 1982 | Complete last increment of construction plans. |
| 1 Apr 1982 | Advertise for bids for last increment of construction. |
| 1 May 1982 | Receive bids for last increment of construction. |
| 1 June 1982 | Award contract for last increment of construction. |
| 1 July 1982 | Start construct for last increment of construction. |
| 1 Mar 1984 | All construction completed except individual house connections. |
| 1 Apr 1984 | Begin making individual house connections and begin treatment plant operation. |
| 1 Nov 1985 | Make last individual house connection. |
| 1 Jul 1995 | Possible connection of Liberty Lake to the system. |

TABLE 3

SUMMARY OF POPULATION
AND FLOW FORECASTS
CITY-NORTH SPOKANE SUBSYSTEM

| | 1980 | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|
| SERVICE POPULATIONS | | | | | |
| North Spokane Area | | | | | |
| Inside City[1] | 2,493 | 2,695 | 5,352 | 8,586 | 10,343 |
| Outside City[1] | 14,727 | 15,384 | 17,192 | 27,372 | 33,842 |
| Subtotal | 17,220 | 18,079 | 22,544 | 35,958 | 44,185 |
| City Service Area | 177,945 | 180,120 | 182,506 | 185,437 | 189,282 |
| TOTAL | 195,165 | 198,199 | 205,050 | 221,395 | 233,467 |
| North Spokane Area remaining on Interim Facilities | 1,060 | 1,800 | - | - | - |
| FLOWS - Millions of Gallons Per Day, ADWF | | | | | |
| North Spokane Area | 2.4 | 2.8 | 3.9 | 4.8 | 5.8 |
| City Service Area | 30.0 | 31.4 | 32.4 | 33.4 | 34.2 |
| TOTAL TO CITY STP | 32.4 | 34.2 | 36.3 | 38.2 | 40.0 |
| To Interim Facilities | 0.1 | 0.2 | - | - | - |

[1] These figures do not agree exactly with those developed in Section 406.1 and 406.2 due to subsequent refinements in the process of internal sewerage staging.

TABLE 4

SUMMARY OF POPULATION AND FLOW FORECASTS
SPOKANE VALLEY SUBSYSTEM

| | 1985 | 1990 | 1995 | 2000 | 2005 |
|---|---|---|---|---|---|
| SERVICE POPULATION[1] | 47,814 | 52,858 | 59,865<br>61,332[2] | 67,630<br>69,210[2] | 73,079<br>74,788[2] |
| FLOW - Millions of Gallons Per Day - ADWF | 7.0 | 7.8 | 8.5<br>8.7[2] | 9.4<br>9.6[2] | 10.0<br>10.2[2] |



[1] These figures do not agree exactly with those developed in Section 406.1 and 406.2 due to subsequent refinements in the process of internal sewerage staging.

[2] Including addition of Liberty Lake.

TABLE 5

CAPITAL COST[1] SUMMARY
CITY-NORTH SPOKANE SUBSYSTEM

| | Internal Sewerage Facilities | | | | | |
|---|---|---|---|---|---|---|
| | | City Service Area | | | | |
| Year | N. Spokane Service Area | New Customers | Correction of Existing Sewers | Conveyance N. Spokane to City STP | Additions to City STP | Total |
| 1980 | 8,647,000 | 152,000 | 7,000,000 | 4,297,000 | 300,000 | 20,396,000 |
| 1981 | 133,000 | 152,000 | 7,000,000 | - | - | 7,285,000 |
| 1982 | 133,000 | 152,000 | 7,000,000 | - | - | 7,285,000 |
| 1983 | 133,000 | 152,000 | 7,000,000 | - | - | 7,285,000 |
| 1984 | 133,000 | 152,000 | 7,000,000 | - | - | 7,285,000 |
| 1985 | 1,469,000 | 167,000 | 7,000,000 | - | - | 8,636,000 |
| 1986 | 221,000 | 167,000 | 7,000,000 | - | - | 7,388,000 |
| 1987 | 221,000 | 167,000 | 7,000,000 | - | - | 7,388,000 |
| 1988 | 221,000 | 167,000 | - | - | - | 388,000 |
| 1989 | 221,000 | 167,000 | - | - | - | 388,000 |
| 1990 | 6,328,000 | 205,000 | - | 1,408,000 | 700,000 | 8,641,000 |
| 1991 | 501,000 | 205,000 | - | - | - | 706,000 |
| 1992 | 501,000 | 205,000 | - | - | - | 706,000 |
| 1993 | 501,000 | 205,000 | - | - | - | 706,000 |
| 1994 | 501,000 | 205,000 | - | - | - | 706,000 |
| 1995 | 683,000 | 268,000 | - | - | - | 951,000 |
| 1996 | 683,000 | 268,000 | - | - | - | 951,000 |
| 1997 | 683,000 | 268,000 | - | - | - | 951,000 |
| 1998 | 683,000 | 268,000 | - | - | - | 951,000 |
| 1999 | 683,000 | 268,000 | - | - | - | 951,000 |
| 2000 | - | - | - | - | - | - |
| TOTALS | 23,279,000 | 3,960,000 | 56,000,000 | 5,705,000 | 1,000,000 | 89,944,000 |

[1] As Project Cost = 1.4 x Construction Cost for structural elements and 1.25 x acquisition cost for land.

TABLE 6

OPERATION AND MAINTENANCE COSTS
CITY-NORTH SPOKANE SUBSYSTEM

| Cost Element | Average Annual Costs at Year | | | | |
|---|---|---|---|---|---|
| | 1980 | 1985 | 1990 | 1995 | 2000 |
| Treatment Plant | 2,098,000 | 2,146,000 | 2,204,000 | 2,256,000 | 2,303,000 |
| Conveyance Facilities | 49,400 | 51,300 | 71,300 | 73,500 | 75,600 |
| Internal Sewerage, North Spokane | 32,000 | 34,800 | 39,500 | 62,900 | 77,300 |
| Internal Sewerage, City | 489,300 | 360,200 | 365,000 | 370,900 | 378,600 |
| Customer Service, North Spokane | 58,500 | 63,600 | 72,100 | 115,100 | 141,400 |
| Customer Service, City | 569,400 | 576,400 | 584,000 | 593,400 | 605,700 |
| Interim Facilities | 8,100 | 6,900(1) | - | - | - |
| TOTAL | 3,304,700 | 3,239,200 | 3,335,900 | 3,471,800 | 3,581,600 |

(1) Operation extends to 1989.

TABLE 7

CAPITAL COST[1] SUMMARY
SPOKANE VALLEY SUBSYSTEM

| Year | Internal Sewerage Facilities[2] | Treatment Plant | Disposal Outfall | Total |
|---|---|---|---|---|
| 1985 | 41,587,000 | 9,336,000 | 1,708,000 | 52,631,000 |
| 1986 | 507,000 | - | - | 507,000 |
| 1987 | 507,000 | - | - | 507,000 |
| 1988 | 507,000 | - | - | 507,000 |
| 1989 | 507,000 | - | - | 507,000 |
| 1990 | 2,540,000 | - | - | 2,540,000 |
| 1991 | 462,000 | - | - | 462,000 |
| 1992 | 462,000 | - | - | 462,000 |
| 1993 | 462,000 | - | - | 462,000 |
| 1994 | 462,000 | - | - | 462,000 |
| 1995 | 2,488,000 | - | - | 2,488,000 |
| 1996 | 582,000 | - | - | 582,000 |
| 1997 | 582,000 | - | - | 582,000 |
| 1998 | 582,000 | - | - | 582,000 |
| 1999 | 582,000 | - | - | 582,000 |
| 2000 | 1,304,000 | - | - | 1,304,000 |
| 2001 | 486,000 | - | - | 486,000 |
| 2002 | 486,000 | - | - | 486,000 |
| 2003 | 486,000 | - | - | 486,000 |
| 2004 | 486,000 | - | - | 486,000 |
| 2005 | - | - | - | - |
| TOTALS | 56,0o/,000 | 9,336,000 | 1,708,000 | 67,111,000 |

[1] As project cost = 1.4 x construction cost for structural elements and 1.25 x acquisition cost for land.

[2] Does not include Liberty Lake internal sewerage or transmission.

TABLE 8

OPERATION AND MAINTENANCE COSTS
SPOKANE VALLEY SUBSYSTEM

| | Average Annual Costs at Year | | | | |
|---|---|---|---|---|---|
| | 1985 | 1990 | 1995 | 2000 | 2005 |
| Treatment Plant and Outfall | 667,000 | 692,000 | 713,000 | 742,000 | 762,000 |
| Internal Sewerage[1] | 84,000 | 93,000 | 105,000 | 118,000 | 128,000 |
| Customer Service[1] | 153,000 | 169,000 | 192,000 | 216,000 | 234,000 |



[1] Does not include Liberty Lake.

FIGURE A

NORTH SPOKANE AREA
CONVEYANCE AND INTERNAL SEWERS

See 801.4-99

FIGURE B

NORTH SPOKANE AREA
SEWERAGE PLAN

See 801.4-100

## LIST OF REFERENCES

Carelli, Charles J., 1971. Cost Estimating Sewerage and Sewage Treatment Facilities, State of Washington, Department of Ecology. K-T #588.

Smith, R. and Eilers, R. G. 1970. Cost to the Consumer for Collection and Treatment of Wastewater. For U.S. Environmental Protection Agency, Project #17090, July 1970.

APPENDIX I

COST ESTIMATE

Element: Conveyance-North Spokane to City STP-1980 Increment
FRANCIS BLVD. ROUTE

| Item | Description | Size | Quantity | Units | Unit Price | Ref. | Construction Cost |
|---|---|---|---|---|---|---|---|
| Pipeline | Force Main #1, Dev 100 psi | 30" | 20,000 | LF | 51.17 | B-2 | 1,023,400 |
| | Gravity Sewer #1 Dev | 42" | 10,800 | LF | 86.85 | B-1 | 937,980 |
| | Gravity Sewer #2 Dev | 42" | 200 | LF | 86.85 | B-1 | 17,370 |
| | SUBTOTAL | | | | | | 1,978,750 |
| Pump Sta. | Pump Sta #1 Raw Sewage | 3.6 MGD | 1 | EA | - | B-3 | 265,000 |
| | Pump Sta #2 Raw Sewage | 3.8 MGD | 1 | EA | - | B-3 | 272,000 |
| | Pump Sta #3 Raw Sewage | 11.1 MGD | 1 | EA | - | B-3 | 550,000 |
| | SUBTOTAL | | | | | | 1,087,000 |
| Land | Site Pump Sta #1 | 2500 SF | 1 | EA | 1000 | | 1,000 |
| | Site Pump Sta #2 | 2500 SF | 1 | EA | 1000 | | 1,000 |
| | Site Pump Sta #3 | 2611 SF | 1 | EA | 1000 | | 1,000 |
| | SUBTOTAL | | | | | | 3,000 |
| | TOTAL | | | | | | 3,068,750 |

APPENDIX II

COST ESTIMATE

Element: Conveyance-North Spokane to City STP - 1990 Increment
FRANCIS BLVD. ROUTE

| Item | Description | Size | Quantity | Units | Unit Price | Ref. | Construction Cost |
|---|---|---|---|---|---|---|---|
| Pipeline | Force Main #2 Open 100 psi | 14" | 10,100 | LF | 19.50 | B-2 | 279,871 |
| | Force Main #3 Open 100 psi | 16" | 11,450 | LF | 21.59 | B-2 | 342,584 |
| | SUBTOTAL | | | | | | 622,455 |
| Pump Sta | Pump Sta #4 Raw Sewage | 2.0 MGD | 1 | EA | - | B-3 | 180,000 |
| | Pump Sta #5 Raw Sewage | 2.4 MGD | 1 | EA | - | B-3 | 200,000 |
| | SUBTOTAL | | | | | | 380,000 |
| Land | Site Pump Sta #4 | 2500 SF | 1 | EA | 500 | | 500 |
| | Site Pump Sta #5 | 2500 SF | 1 | EA | 500 | | 500 |
| | R/W Force Main #2 | - | 115 | ROD | 6.00 | E-3 | 691 |
| | R/W Force Main #3 | - | 258 | ROD | 6.00 | E-3 | 1,545 |
| | SUBTOTAL | | | | | | 3,236 |
| | TOTAL | | | | | | 1,005,691 |

APPENDIX III

COST ESTIMATE

Element: Internal Sewerage - North Spokane Area

| Item | Description | Size | Quantity | Units | Unit Price | Ref. | Construction Cost |
|---|---|---|---|---|---|---|---|
| 1980 | INCREMENT[1] | | | | | | |
| | Gravity Sewers-Paved | 8" | 162,036 | LF | 21.50 | B-1 | 3,483,774 |
| | Gravity Sewers-Unpaved | 8" | 40,509 | LF | 12.97 | B-1 | 525,402 |
| | Gravity Sewers-Paved | 12" | 9,000 | LF | 23.74 | B-1 | 213,660 |
| | Gravity Sewers-Unpaved | 12" | 3,030 | LF | 14.98 | B-1 | 45,389 |
| | Gravity Sewers-Paved | 15" | 6,890 | LF | 28.13 | B-1 | 130,107 |
| | Gravity Sewers-Unpaved | 15" | 5,280 | LF | 18.64 | B-1 | 148,526 |
| | Gravity Sewers-Paved | 21" | 8,770 | LF | 32.08 | B-1 | 281,342 |
| | Gravity Sewers-Unpaved | 27" | 660 | LF | 36.24 | B-1 | 23,918 |
| | Gravity Sewers-Unpaved | 30" | 1,850 | LF | 40.36 | B-1 | 74,666 |
| | Force Main Paved (100 psi) | 8" | 3,960 | LF | 22.00 | B-2 | 87,120 |
| | Force Main Paved (100 psi) | 16" | 5,140 | LF | 29.92 | B-2 | 153,789 |
| | Pump Sta #6 Raw Sewage | 0.8 MGD | 1 | EA | - | B-3 | 100,000 |
| | Sidesewers | 6" | 3617 | EA | 225.00 | | 813,825 |
| | TOTAL | | | | | | 6,081,518 |
| 1980-1984 | INCREMENT[2] | | | | | | |
| | Gravity Sewers, Paved | 8" | 2,798 | LF | 21.50 | B-1 | 60,157 |
| | Gravity Sewers, Unpaved | 8" | 25,184 | LF | 12.97 | B-1 | 326,636 |
| | Sidesewers | 6" | 500 | EA | 175.00 | | 87,500 |
| | | | | | | | 474,293 |
| 1985 | INCREMENT | | | | | | |
| | Gravity Sewers Paved | 12" | 7,790 | LF | 23.74 | B-1 | 184,935 |
| | Force Main Paved (100 psi) | 12" | 5,810 | LF | 25.96 | B-2 | 150,828 |
| | Force Main Paved (100 psi) | 16" | 6,730 | LF | 29.92 | B-2 | 201,362 |
| | Pump Sta #7 Raw Sewage | 2.6 MGD | 1 | EA | - | B-3 | 212,000 |
| | Pump Sta #8 Raw Sewage | 1.4 MGD | 1 | EA | - | B-3 | 142,000 |
| | TOTAL | | | | | | 891,125 |

[1] Design population 17,220 of whom 5,646 are already served by 8" sewers to interim facilities. Cost for these existing sewers not included.

[2] To serve the increase in customers represented by the difference between the 1985 and 1980 design population, 19879-18280 = 1599 including those remaining on interim facilities.

APPENDIX III - Continued

COST ESTIMATE

Element: Internal Sewerage - North Spokane Area

| Item | Description | Size | Quantity | Units | Unit Price | Ref. | Construction Cost |
|---|---|---|---|---|---|---|---|
| 1985-1989 | INCREMENT[1] | | | | | | |
| | Gravity Sewers, Paved | 8" | 4,664 | LF | 21.50 | B-1 | 100,276 |
| | Gravity Sewers, Unpaved | 8" | 41,974 | LF | 12.97 | B-1 | 544,403 |
| | Sidesewers | 6" | 833 | EA | 175.00 | | 145,775 |
| | TOTAL | | | | | | 790,454 |
| 1990 | INCREMENT[2] | | | | | | |
| | Gravity Sewers, Paved | 8" | 12,912 | LF | 21.50 | B-1 | 277,608 |
| | Gravity Sewers, Unpaved | 8" | 116,204 | LF | 12.97 | B-1 | 1,507,166 |
| | Gravity Sewers, Paved | 12" | 39,000 | LF | 23.74 | B-1 | 925,860 |
| | Gravity Sewers, Unpaved | 12" | 5,020 | LF | 14.98 | B-1 | 75,200 |
| | Gravity Sewers, Paved | 15" | 3,960 | LF | 28.13 | B-1 | 111,395 |
| | Gravity Sewers, Unpaved | 15" | 4,360 | LF | 18.64 | B-1 | 81,270 |
| | Force Main Paved (100 psi) | 12" | 6,210 | LF | 25.96 | B-2 | 161,212 |
| | Force Main Paved (100 psi) | 14" | 4,090 | LF | 27.71 | B-2 | 113,334 |
| | Pump Sta #9 Raw Sewage | 1.7 MGD | 1 | EA | - | B-3 | 160,000 |
| | Pump Sta #10 Raw Sewage | 1.0 MGD | 1 | EA | - | B-3 | 115,000 |
| | Pump Sta #11 Raw Sewage | 1.0 MGD | 1 | EA | - | B-3 | 115,000 |
| | Sidesewers | 6" | 2,306 | EA | 225.00 | | 518,850 |
| | TOTAL | | | | | | 4,161,895 |
| 1990-1994 | INCREMENT[3] | | | | | | |
| | Gravity Sewers, Paved | 8" | 10,563 | LF | 21.50 | B-1 | 227,104 |
| | Gravity Sewers, Unpaved | 8" | 95,067 | LF | 12.97 | B-1 | 1,233,019 |
| | Sidesewers | 6" | 1,886 | EA | 175.00 | | 330,050 |
| | TOTAL | | | | | | 1,790,173 |

[1] To serve the 1985-1990 customer increment 22,544-19,879 = 2665.

[2] To extend service into new areas and serve 7378 persons in existing structures.

[3] To serve 1990-1995 customer increment 35,958-22,544 = 13,414 of which 6036 are in new structures and 7378 in existing structures.

APPENDIX III - Continued

COST ESTIMATE

Element: Internal Sewerage - North Spokane Area

| Item | Description | Size | Quantity | Units | Unit Price | Ref. | Construction Cost |
|---|---|---|---|---|---|---|---|
| 1995 | INCREMENT<br>No Major Sewers | | | | | | |
| 1995-2000 | INCREMENT[1] | | | | | | |
| | Gravity Sewers, Paved | 8" | 14,397 | LF | 21.50 | B-1 | 309,536 |
| | Gravity Sewers, Unpaved | 8" | 129,575 | LF | 12.97 | B-1 | 1,680,588 |
| | Sidesewers | 6" | 2,571 | EA | 175.00 | | 449,925 |
| | TOTAL | | | | | | 2,440,049 |

[1] To serve 1995-2000 customer increment 44,185-35,958 = 8227.

APPENDIX IV

COST ESTIMATE

Element: Internal Sewers - City

| Item | Description | Size | Quantity | Units | Unit Price | Ref. | Construction Cost |
|---|---|---|---|---|---|---|---|
| 1980-1985 | INCREMENT[1] | | | | | | |
| | Gravity Sewers, Paved | 8" | 10,080 | LF | 21.50 | B-1 | 216,720 |
| | Gravity Sewers, Unpaved | 8" | 17,518 | LF | 12.97 | B-1 | 227,208 |
| | Sidesewers, Paved | 6" | 199 | EA | 225 | | 44,775 |
| | Sidesewers, Unpaved | 6" | 306 | EA | 175 | | 53,550 |
| | TOTAL | | | | | | 542,253 |
| 1985-1990 | INCREMENT[2] | | | | | | |
| | Gravity Sewers, Paved | 8" | 11,060 | LF | 21.50 | B-1 | 237,790 |
| | Gravity Sewers, Unpaved | 8" | 19,215 | LF | 12.97 | B-1 | 249,219 |
| | Sidesewers, Paved | 6" | 218 | EA | 225 | | 49,050 |
| | Sidesewers, Unpaved | 6" | 336 | EA | 175 | | 58,800 |
| | TOTAL | | | | | | 594,859 |
| 1990-1995 | INCREMENT[3] | | | | | | |
| | Gravity Sewers, Paved | 8" | 13,598 | LF | 21.50 | B-1 | 292,357 |
| | Gravity Sewers, Unpaved | 8" | 23,590 | LF | 12.97 | B-1 | 305,962 |
| | Sidesewers, Paved | 6" | 268 | EA | 225 | | 60,300 |
| | Sidesewers, Unpaved | 6" | 412 | EA | 175 | | 72,100 |
| | TOTAL | | | | | | 730,719 |
| 1995-2000 | INCREMENT[4] | | | | | | |
| | Gravity Sewers, Paved | 8" | 17,833 | LF | 21.50 | B-1 | 383,410 |
| | Gravity Sewers, Unpaved | 8" | 30,958 | LF | 12.97 | B-1 | 401,525 |
| | Sidesewers, Paved | 6" | 352 | EA | 225 | | 79,200 |
| | Sidesewers, Unpaved | 6" | 541 | EA | 175 | | 94,675 |
| | TOTAL | | | | | | 958,810 |

[1] Population increase 180,120-177,945 = 2175

[2] Population increase 182,506-180,120 = 2386

[3] Population increase 185,437-182,506 = 2931

[4] Population increase 189,282-185,437 = 3845

APPENDIX V

OPERATION AND MAINTENANCE COSTS
CITY-NORTH SPOKANE SUBSYSTEM
INTERNAL SEWERAGE

| | 1980 | 1985 | 1990 | 1995 | 2000 |
|---|---|---|---|---|---|
| North Spokane Internal Sewerage | | | | | |
| Service Population | 18,280 | 19,879 | 22,544 | 35,958 | 44,185 |
| Annual Cost @ 1.75 | 31,990 | 34,788 | 39,452 | 62,927 | 77,324 |
| City Internal Sewerage | | | | | |
| Service Population | 177,945 | 180,120 | 182,506 | 185,437 | 189,282 |
| Annual Cost @ 2.75 to 1985 then 2.00 1985 to 2000 | 489,349 | 360,240 | 365,012 | 370,874 | 378,564 |
| North Spokane Customer Service @ $3.20/capita | 58,496 | 63,613 | 72,141 | 115,066 | 141,392 |
| City Customer Service @ $3.20/capita | 569,424 | 576,384 | 584,019 | 593,398 | 605,702 |

(1) Includes population remaining on interim facilities.

APPENDIX VI

OPERATION AND MAINTENANCE COSTS
CONVEYANCE-NORTH SPOKANE TO CITY STP

Sewer and Force Main Component

O&M equal capital cost times 0.5 percent.

| Construction Year | Cumulative Capital Cost | O&M at 0.5 Percent |
|---|---|---|
| 1980 | 1,979,000 | 9,895 |
| 1990 | 2,601,000 | 13,005 |

Pump Station Component

Composed of two elements, O&M on the facilities and electrical power.

Facilities O&M

| Construction Year | Pump Sta | Nominal Capacity Mgd | O&M From Figure G-2 Dollars Per Year |
|---|---|---|---|
| 1980 | #1 | 3.6 | $ 9,000 |
| | #2 | 3.8 | 9,250 |
| | #3 | 11.1 | 15,500 |
| 1990 | #4 | 2.0 | 6,950 |
| | #5 | 2.4 | 7,500 |

Electrical Power - Annual Energy Cost Figure (G-3)

| Pump Sta | Initial Operation Year | Cost | Year 2000 Operation Cost |
|---|---|---|---|
| 1 | 1980 | 926 | 2,986 |
| 2 | 1980 | 388 | 1,088 |
| 3 | 1980 | 4,473 | 8,993 |
| 4 | 1990 | 421 | 901 |
| 5 | 1990 | 230 | 460 |

APPENDIX VII

OPERATION AND MAINTENANCE COSTS
CITY STP

Wastewater Component, 40 mgd Capacity, existing in 1980

| Element | Annual Cost | Ref. |
|---|---|---|
| Headworks and Primary | 470,000 | H-1 |
| Activated Sludge Reactor | 390,000 | H-1 |
| Chlorination Facilities | 16,500 | H-3 |
| Subtotal w/o solids handling | 876,500 | |

Chemicals for phosphorus removal (Ref. H-1)

| Year | Average Flow Mgd | Year Around Operation | Seasonal May 1 - Oct 15 |
|---|---|---|---|
| 1980 | 32.4 | 596,970 | 273,611 |
| 1985 | 34.2 | 630,135 | 288,812 |
| 1990 | 36.3 | 668,828 | 306,546 |
| 1995 | 38.2 | 703,835 | 322,591 |
| 2000 | 40.0 | 737,000 | 337,792 |

Chlorine costs for disinfection (Ref. H-3)

| Year | Average Flow Mgd | Chemical Cost @ 5 mg/l Dosage |
|---|---|---|
| 1980 | 32.4 | 43,200 |
| 1985 | 34.2 | 45,600 |
| 1990 | 36.3 | 48,400 |
| 1995 | 38.2 | 50,933 |
| 2000 | 40.0 | 53,333 |

APPENDIX VII - Continued

OPERATION AND MAINTENANCE COSTS
CITY STP

Solids Processing Components

| Element | Size or Capacity | Annual OPM Cost | Ref. |
|---|---|---|---|
| Gravity Thickener | 3850 SF | 11,000 | I-1 (3) |
| Flotation Thickener | 2400 SF | 18,500 | I-1 |
| Anaerobic Digestion | 825,000 CF | 195,000 | I-2 |
| Vacuum Filtration | 9,461 to 11,680 tons/yr | See Table | I-3 |
| Truck Haul | 144 to 178 cy/day | See Table | I-5 |
| Sanitary Landfill | 144 to 178 cy/day | See Table | I-5 |

| Year | Aver. Flow Mgd | Dry Solids to Vacuum Filtration tons/yr (1) | Annual Cost Vacuum Filtra. O&M | Filter Cake cy/day (2) | Annual Cost Cake Haul & Sanitary Landfill |
|---|---|---|---|---|---|
| 1980 | 32.4 | 9,461 | 195,000 | 144 | 162,000 |
| 1985 | 34.2 | 9,986 | 203,000 | 152 | 166,000 |
| 1990 | 36.3 | 10,600 | 211,000 | 161 | 175,000 |
| 1995 | 38.2 | 11,154 | 220,000 | 170 | 180,000 |
| 2000 | 40.0 | 11,680 | 225,000 | 178 | 187,000 |

(1) At 1600 pounds per mg per plant design criteria.

(2) At 20 percent solids and density 65 pounds per cubic foot (equal .18 tons dry solids per cy).

(3) O&M of gravity thickener taken as equal to elutriation.

APPENDIX VIII

OPERATION AND MAINTENANCE COSTS
INTERIM FACILITIES IN NORTH SPOKANE

| Name | Kind | Capacity | Annual O&M Cost |
|---|---|---|---|
| Northwest Terrace | Mechanical | .3 mgd | 5 300[1] |
| Sundance Hills | Lagoon | 200 homes | 1,200 |
| Pacific Park | Lagoon | 60 homes | 400 |
| SUBTOTAL, Remaining in service to 1990 | | | 6,900 |
| Camelot-Carriage Hills | Lagoon | 200 homes | 1,200 |
| SUBTOTAL, Remaining in service to 1985 | | | 8,100 |

(1) Based on supervision of 1 man hour per day 250 days per year plus 5 percent of estimated capital cost.

APPENDIX IX

COST ESTIMATE

Element: Internal Sewerage - Spokane Valley - 1985-2005

| Item | Description | Size | Quantity | Units | Unit Price | Ref. | Construction Cost |
|---|---|---|---|---|---|---|---|
| 1985 | INCREMENT(1) | | | | | | |
| | Gravity Sewers, Paved | 8" | 683,740 | LF | 21.50 | B-1 | 14,700,410 |
| | Gravity Sewers, Unpaved | 8" | 368,168 | LF | 12.97 | B-1 | 4,775,139 |
| | Gravity Sewers, Paved | 12" | 26,895 | LF | 23.74 | B-1 | 638,487 |
| | Gravity Sewers, Paved | 15" | 16,335 | LF | 28.13 | B-1 | 459,504 |
| | Gravity Sewers, Paved | 18" | 12,045 | LF | 29.31 | B-1 | 353,039 |
| | Gravity Sewers, Paved | 21" | 13,200 | LF | 32.08 | B-1 | 423,456 |
| | Gravity Sewers, Paved | 24" | 14,850 | LF | 39.37 | B-1 | 584,644 |
| | Gravity Sewers, Paved | 27" | 2,970 | LF | 49.12 | B-1 | 145,886 |
| | Gravity Sewers, Paved | 30" | 4,950 | LF | 53.69 | B-1 | 265,766 |
| | Gravity Sewers, Paved | 36" | 19,305 | LF | 74.01 | B-1 | 1,428,763 |
| | Gravity Sewers, Paved | 42" | 10,230 | LF | 86.85 | B-1 | 888,476 |
| | Gravity Sewers, Paved | 48" | 7,260 | LF | 97.80 | B-1 | 710,028 |
| | Force Main Paved (100 psi) | 12" | 16,005 | LF | 25.96 | B-2 | 415,490 |
| | Pump Sta #1 Raw Sewage | 2.3 MGD | 1 | EA | - | B-3 | 192,000 |
| | Sidesewers | 6" | 14,942 | EA | 225.00 | | 3,361,950 |
| | TOTAL | | | | | | 29,343,038 |
| 1985-1989 | INCREMENT(2) | | | | | | |
| | Gravity Sewers, Paved | 8" | 11,097 | LF | 21.50 | B-1 | 238,586 |
| | Gravity Sewers, Unpaved | 8" | 99,871 | LF | 12.97 | B-1 | 1,295,327 |
| | Sidesewers | 6" | 1,576 | EA | 175.00 | | 275,800 |
| | TOTAL | | | | | | 1,809,713 |
| 1990 | INCREMENT(3) | | | | | | |
| | Gravity Sewers, Paved | 8" | 5,302 | LF | 21.50 | B-1 | 113,993 |
| | Gravity Sewers, Unpaved | 8" | 47,718 | LF | 12.97 | B-1 | 618,902 |
| | Gravity Sewers, Paved | 12" | 11,798 | LF | 23.74 | B-1 | 280,085 |
| | Gravity Sewers, Paved | 15" | 10,725 | LF | 28.13 | B-1 | 301,694 |
| | Sidesewers | 6" | 753 | EA | 225.00 | | 169,425 |
| | TOTAL | | | | | | 1,484,099 |

(1) Design population 47,814.

(2) To serve 1985-1989 customer increment: 52,858-47,814 = 5044.

(3) To extend service into new areas to serve 2410 persons in existing structures.

APPENDIX IX - Continued

COST ESTIMATE

Element: Internal Sewerage - Spokane Valley - 1985-2005

| Item | Description | Size | Quantity | Units | Unit Price | Ref. | Construction Cost |
|---|---|---|---|---|---|---|---|
| 1990-1994 | INCREMENT[1] | | | | | | |
| | Gravity Sewers, Paved | 8" | 10,113 | LF | 21.50 | B-1 | 217,430 |
| | Gravity Sewers, Unpaved | 8" | 91,021 | LF | 12.97 | B-1 | 1,180,542 |
| | Sidesewers | 6" | 1,437 | EA | 175.00 | | 251,475 |
| | TOTAL | | | | | | 1,649,447 |
| 1995 | INCREMENT[2] | | | | | | |
| | Gravity Sewers, Paved | 8" | 4,332 | LF | 21.50 | B-1 | 93,138 |
| | Gravity Sewers, Unpaved | 8" | 38,936 | LF | 12.97 | B-1 | 505,648 |
| | Gravity Sewers, Paved | 12" | 7,260 | LF | 23.74 | B-1 | 172,352 |
| | Gravity Sewers, Paved | 15" | 4,785 | LF | 28.13 | B-1 | 134,602 |
| | Gravity Sewers, Paved | 18" | 10,808 | LF | 29.31 | B-1 | 316,782 |
| | Sidesewers | 6" | 615 | EA | 225.00 | | 138,375 |
| | TOTAL | | | | | | 1,360,897 |
| 1995-1999 | INCREMENT[3] | | | | | | |
| | Gravity Sewers, Paved | 8" | 12,751 | LF | 21.50 | B-1 | 274,146 |
| | Gravity Sewers, Unpaved | 8" | 114,761 | LF | 12.97 | B-1 | 1,488,450 |
| | Sidesewers | 6" | 1,811 | EA | 175.00 | | 316,925 |
| | TOTAL | | | | | | 2,079,521 |

[1] To serve 1990-1994 customer increment 59,865-52,858 = 7,007, of which 4,597 are in new structures and 2,410 in existing structures.

[2] To extend service into new areas and serve 1,969 persons in existing structures.

[3] To serve 1995-1999 customer increment 67,630-59,865 = 7,765, of which 5,796 are in new structures and 1,969 in existing structures.

APPENDIX IX - Continued

COST ESTIMATE

Element: Internal Sewerage - Spokane Valley - 1985-2005

| Item | Description | Size | Quantity | Units | Unit Price | Ref. | Construction Cost |
|---|---|---|---|---|---|---|---|
| 2000 | INCREMENT[1] | | | | | | |
| | Gravity Sewers, Paved | 8" | 1,351 | LF | 21.50 | B-1 | 29,046 |
| | Gravity Sewers, Unpaved | 8" | 12,157 | LF | 12.97 | B-1 | 157,676 |
| | Gravity Sewers, Paved | 12" | 4,290 | LF | 23.74 | B-1 | 101,845 |
| | Force Main Paved (100 psi) | 8" | 6,270 | LF | 22.00 | B-2 | 137,940 |
| | Pump Sta #2 Raw Sewage | 1.0 MGD | 1 | EA | - | B-3 | 115,000 |
| | Sidesewers | 6" | 192 | EA | 225.00 | | 43,200 |
| | TOTAL | | | | | | 584,707 |
| 2000-2004 | INCREMENT[2] | | | | | | |
| | Gravity Sewers, Paved | 8" | 10,637 | LF | 21.50 | B-1 | 228,696 |
| | Gravity Sewers, Unpaved | 8" | 95,733 | LF | 12.97 | B-1 | 1,241,657 |
| | Sidesewers | 6" | 1,511 | EA | 175.00 | | 264,425 |
| | TOTAL | | | | | | 1,734,778 |

[1] To extend service into new areas and serve 614 persons in existing structures.

[2] To serve 2000-2005 customer increment 73,079-67,630 = 5,449, of which 4,835 are in new structures and 614 in existing structures.

APPENDIX X

COST ESTIMATE

Element: Treatment Facilities - Spokane Valley - 1985 Increment

| Item | Description | Size | Quantity | Units | Unit Price | Ref. | Construction Cost |
|---|---|---|---|---|---|---|---|
| Treat- | Primary Treatment | 10 MGD | - | - | LS | C-1 | 2,550,000 |
| ment | Activated Sludge | 10 MGD | - | - | LS | C-1 | 2,300,000 |
| Faci- | Chlorination | 10 MGD | - | - | LS | C-3 | 130,000 |
| lities | SUBTOTAL | | | | | | 4,980,000 |
| Solids | Dissolved Air Flotation | 696 SF | - | - | LS | D-1 | 115,000 |
| Handling | Anaerobic Digestion | 282,946 CF | - | - | LS | D-2 | 930,000 |
| Faci- | Elutriation | 3400 SF | - | - | LS | D-1 | 226,000 |
| lities | Vacuum Filtration | 272 SF | - | - | LS | D-3 | 355,000 |
| | SUBTOTAL | | | | | | 1,626,000 |
| Land | Site: Treatment Plant | - | 12.2 | AC | 2000.00 | E-3 | 24,400 |
| | Site: Sanitary Land-fill | - | 92 | AC | 500.00 | | 46,000 |
| | SUBTOTAL | | | | | | 70,400 |
| | TOTAL | | | | | | 6,676,400 |

APPENDIX X - Continued

COST ESTIMATE

Element: Conveyance - Spokane Valley Outfall - 1985 Increment

| Item | Description | Size | Quantity | Units | Unit Price | Ref. | Construction Cost |
|---|---|---|---|---|---|---|---|
| | Gravity Sewer, Paved | 54" | 10,296 | LF | 111.59 | B-1 | 1,148,931 |
| | Gravity Sewer, Unpaved | 54" | 792 | LF | 89.84 | B-1 | 71,153 |
| | TOTAL | | | | | | 1,220,084 |

APPENDIX XI

OPERATION AND MAINTENANCE COSTS
SPOKANE VALLEY SUBSYSTEM
INTERNAL SEWERAGE

| | 1985 | 1990 | 1995 | 2000 | 2005 |
|---|---|---|---|---|---|
| Service Population | 47,814 | 52,858 | 59,865 | 67,630 | 73,079 |
| Annual Cost for Operation & Maintenance at $1.75/capita | 83,675 | 92,502 | 104,764 | 118,353 | 127,888 |
| Annual Cost for Customer Service at $3.20/capita | 153,005 | 169,146 | 191,568 | 216,416 | 233,853 |

APPENDIX XII

OPERATION AND MAINTENANCE COST
SPOKANE VALLEY SUBSYSTEM
TREATMENT PLANT AND OUTFALL

Wastewater Component, 10 mgd capacity, in service 1985

| Element | Annual Cost | Ref |
|---|---|---|
| Headworks and Primary | 162,000 | H-1 |
| Activated Sludge Reactors | 134,000 | H-1 |
| Chlorination Facilities | 10,200 | H-3 |
| Outfall | 6,100 | G-1 |
| Subtotal w/o solids handling | 312,300 | |

Chemical Costs

| Year | Average Flow Mgd | Costs Ref H-1 Alum for Phosphorus Removal Year Around | Costs Ref H-1 Alum for Phosphorus Removal Seasonal(1) | Costs Ref H-3 Chlorine for Disinfection |
|---|---|---|---|---|
| 1985 | 7.0 | 128,975 | 59,114 | 12,240 |
| 1990 | 7.8 | 143,715 | 65,869 | 13,640 |
| 1995 | 8.5 | 156,613 | 71,781 | 14,860 |
| 2000 | 9.4 | 173,195 | 79,381 | 16,430 |
| 2005 | 10.0 | 184,250 | 84,448 | 17,480 |

(1) May 1 to October 15.

APPENDIX XII - Continued

OPERATION AND MAINTENANCE COST
SPOKANE VALLEY SUBSYSTEM
TREATMENT PLANT AND OUTFALL

Solids Processing Components

| Element | Size or Capacity | Annual O&M Cost | Ref. |
|---|---|---|---|
| Flotation | 696 SF | 8,800 | I-1 |
| Anaerobic Digestion | 283,000 CF | 81,000 | I-2 |
| Elutriation | 3,400 SF | 10,200 | I-1 |
| Vacuum Filtration | 2044 to 2920 tons/yr | See Table Below | I-3 |
| Truck Haul | 31.1 to 44.4 cy/day | See Table Below | I-5 |
| Sanitary Landfill | 31.1 to 44.4 cy/day | See Table Below | I-5 |

| | | Vacuum Filtration | | Truck Haul and Landfill | |
|---|---|---|---|---|---|
| Year | Aver. Flow Mgd | Dry Solids Ton/Yr(1) | Annual O&M Cost | Filter Cake Cubic Yards Per Day(2) | Annual Cost |
| 1985 | 7.0 | 2044 | 66,000 | 31.1 | 47,000 |
| 1990 | 7.8 | 2278 | 71,000 | 34.7 | 51,500 |
| 1995 | 8.5 | 2482 | 75,000 | 37.8 | 54,700 |
| 2000 | 9.4 | 2745 | 81,000 | 41.8 | 59,000 |
| 2005 | 10.0 | 2920 | 85,000 | 44.4 | 63,000 |

(1) At 1600 pounds per mg.

(2) At 20 percent solids and density 65 pounds per cf (.18 tons/cy).

APPENDIX XIII

COST ESTIMATE

Element: Upgrade City STP to Infiltration-Percolation Disposal

| Item | Description | Size | Quantity | Units | Unit Price | Ref. | Construction Cost |
|---|---|---|---|---|---|---|---|
| Conveyance | Gravity Sewer, Unpaved | 78" | 5,808 | LF | 160.00 | B-1 | 929,280 |
| | Force Main, Unpaved (100 psi) | 66" | 7,920 | LF | 125.95 | B-2 | 997,524 |
| | Force Main, Unpaved (100 psi) | 60" | 52,800 | LF | 111.64 | B-2 | 5,894,592 |
| | Equal STO Earth Basin Treat. Eff. | 9 MG | - | - | LS | B-4 | 410,000 |
| | Pump Sta #4 Treat. Eff. | 68.4 MGD | - | - | LS | B-3 | 1,200,000 |
| | Pump Sta #5 Treat. Eff. | 52.1 MGD | - | - | LS | B-3 | 1,010,000 |
| | SUBTOTAL | | | | | | 10,441,396 |
| Land | R/W Force Main | — | 160 | ROD | 4.00 | E-3 | 640 |
| | Site EQ. Storage | — | 2.7 | AC | 2000 | E-3 | 5,400 |
| | SUBTOTAL | | | | | | 6,040 |
| | CONVEYANCE SUBTOTAL | | | | | | 10,447,436 |
| Infil. Perc. Pond | Infiltration-Percolation Pond | | 377 | NET AC | 18,267 | C-6 | 6,886,659 |
| Land | Site Infiltration-Percolation Pond | | 528 | AC | 2,000 | E-3 | 1,056,000 |
| | TOTAL | | | | | | 18,390,095 |

APPENDIX XIV

OPERATION AND MAINTENANCE COSTS
CITY PLUS NORTH SPOKANE SUBSYSTEM
UPGRADE TO INFILTRATION-PERCOLATION DISPOSAL

## Conveyance

### Sewer and Force Main Component

O&M equals capital cost times 0.5 percent.

| Construction Year | Capital Cost | O&M at 0.5% - $/Yr |
|---|---|---|
| 1990 | 7,821,396 | 39,107 |

### Equalizing Storage

O&M equals capital cost times 1.0 percent.

| Construction Year | Capital Cost | O&M at 1% - $/Yr |
|---|---|---|
| 1990 | 410,000 | 4,100 |

### Pump Station Component

Composed of 2 elements, O&M on the facilities and electrical power.

#### Facilities O&M

| Pump Sta | Construction Year | Nominal Capacity Mgd | O&M from Fig. G-2, $/Yr |
|---|---|---|---|
| 4 | 1990 | 68.4 | 49,000 |
| 5 | 1990 | 52.1 | 41,000 |

#### Electrical Power - Annual Energy Cost - Fig. G-3

| Pump Sta | Initial Operation Year | Cost |
|---|---|---|
| 4 | 1990 | 16,550 |
| 5 | 1990 | 76,270 |

APPENDIX XIV - Continued

OPERATION AND MAINTENANCE COSTS
CITY PLUS NORTH SPOKANE SUBSYSTEM
UPGRADE TO INFILTRATION-PERCOLATION DISPOSAL

Wastewater Component, 40 mgd Capacity, in Service 1995

| Element | Annual Cost | Ref |
|---|---|---|
| Headworks and Primary | 470,000 | H-1 |
| Activated Sludge Reactors | 390,000 | H-1 |
| Chlorination Facilities | 16,500 | H-3 |
| Subtotal w/o solids handling | 876,500 | |

Chemical Costs

| Year | Average Flow Mgd | Annual Chlorine for Disinfection Cost - Ref H-3 |
|---|---|---|
| 1990 | 36.3 | 48,400 |

APPENDIX XIV - Continued

OPERATION AND MAINTENANCE COSTS
CITY PLUS NORTH SPOKANE SUBSYSTEM
UPGRADE TO INFILTRATION-PERCOLATION DISPOSAL

Solids Processing Component

| Element | Size or Capacity | Annual O&M Cost | Ref |
|---|---|---|---|
| Gravity Thickener | 3850 SF | 11,000 | I-1[1] |
| Flotation Thickener | 2400 SF | 18,500 | I-1 |
| Anaerobic Digestion | 825,000 CF | 195,000 | I-2 |
| Vacuum Filtration | 6413 tons/yr | See Table | I-3 |
| Truckhaul | 98 cy/day | See Table | I-5 |
| Sanitary Landfill | 98 cy/day | See Table | I-5 |

| | | Vacuum Filtration | | Truck Haul and Landfill | |
|---|---|---|---|---|---|
| Year | Aver. Flow Mgd | Dry Solids Tons/Yr[2] | Annual O&M Cost | Filter Cake Cy/Day[3] | Annual Cost |
| 1990 | 36.3 | 6413 | 149,000 | 98 | 123,000 |

Infiltration-Percolation Component

| Year | Net Acreage | Annual Cost - Ref. H-8 |
|---|---|---|
| 1990 | 377 | 290,000 |

[1] O&M gravity thickener taken as equal to elutriation.
[2] At 968 pounds per MG.
[3] At 20% Solids and Density 65 pounds per cf (0.18 tons/cy).

APPENDIX XIV - Continued

OPERATION AND MAINTENANCE COSTS
CITY PLUS NORTH SPOKANE SUBSYSTEM
UPGRADE TO INFILTRATION-PERCOLATION DISPOSAL

Summary

| Component | Annual Cost |
|---|---|
| Conveyance Force Mains and Sewers | 39,107 |
| Equalizing Storage | 4,100 |
| Pump Station #4, Facilities | 49,000 |
| Pump Station #5, Facilities | 41,000 |
| Pump Station #4, Electrical | 16,550 |
| Pump Station #5, Electrical | 76,270 |
| Infiltration Ponds | 290,000 |
| Subtotal, Ponds and Conveyance | 516,027 |
| City STP elements | |
| Fixed w/o solids processing | 876,500 |
| Chemicals (Chlorine only) | 48,400 |
| Fixed solids processing | 224,500 |
| Vacuum Filtration | 149,000 |
| Truck haul and landfill | 123,000 |
| Subtotal City STP | 1,421,400 |
| TOTAL - Treatment and Disposal | 1,937,427 |

APPENDIX XV

COST ESTIMATE

Element: Upgrade Spokane Valley STP to Infiltration-Percolation Disposal

| Item | Description | Size | Quantity | Units | Unit Price | Ref. | Construction Cost |
|---|---|---|---|---|---|---|---|
| Con-veyance | Gravity Sewer, Unpaved | 54" | 16,368 | LF | 89.84 | B-1 | 1,470,501 |
| | Gravity Sewer, Paved | 54" | 29,568 | LF | 111.59 | B-1 | 3,299,493 |
| | Force Main, Paved (100 psi) | 42" | 5,280 | LF | 77.85 | B-2 | 411,048 |
| | Force Main, Unpaved (100 psi) | 42" | 2,640 | LF | 63.50 | B-2 | 167,640 |
| | Pump Sta #1, Treat. Eff. | 22.7 MGD | - | - | LS | B-3 | 590,000 |
| | SUBTOTAL | | | | | | 5,938,682 |
| Land | R/W Gravity Sewer | - | 933 | ROD | 4.00 | E-3 | 3,732 |
| | Site Pump Sta #1 | - | - | LOT | LS | E-3 | 450 |
| | SUBTOTAL | | | | | | 4,182 |
| | CONVEYANCE SUBTOTAL | | | | | | 5,942,864 |
| Infil-Perc. Pond | Infiltration-Percola-tion Pond | - | 94 | NET AC | 18,267 | C-6 | 1,717,098 |
| Land | Site Infiltration Percolation Pond | - | 144 | AC | 1,000 | E-3 | 144,000 |
| | SUBTOTAL CONVEYANCE AND PONDS | | | | | | 7,803,962 |
| Treat. | Nitrification-Denitrification | 10 MGD | - | - | LS | C-1 | 3,400,000 |
| | TOTAL | | | | | | 11,203,962 |

APPENDIX XVI

OPERATION AND MAINTENANCE COSTS
SPOKANE VALLEY SUBSYSTEM
UPGRADE TO INFILTRATION-PERCOLATION DISPOSAL
WASTEWATER TREATMENT AND LAND DISPOSAL

## Conveyance

### Sewer & Force Main Component

O&M equals capital cost times 0.5 percent.

| Construction Year | Capital Cost | O&M at 0.5% - $/Yr. |
|---|---|---|
| 1990 | 5,348,682 | 26,743 |

### Pump Station Component

Composed of one element, O&M on the facilities and electrical power.

#### Facilities O&M

| Construction Year | Nominal Cap. Mgd | O&M from Fig. G-2, $/Yr |
|---|---|---|
| 1990 | 22.7 | 24,200 |

#### Electrical Power - Annual Energy Cost - Fig. G-3

| Initial Operation Year | Cost |
|---|---|
| 1990 | 13,370 |

APPENDIX XVI - Continued

OPERATION AND MAINTENANCE COSTS
SPOKANE VALLEY SUBSYSTEM
UPGRADE TO INFILTRATION-PERCOLATION
WASTEWATER TREATMENT AND LAND DISPOSAL

Wastewater Component 10 Mgd Capacity, In Service 1995

| Element | Annual Cost | Ref |
|---|---|---|
| Headworks and Primary | 162,000 | H-1 |
| Activated Sludge Reactors | 134,000 | H-1 |
| Nitrification-Denitrification | 220,000 | H-1 |
| Chlorination Facilities | 10,200 | H-3 |
| Subtotal w/o Solids Handling | 526,200 | |

Chemical Costs

| Year | Average Flow Mgd | Annual Chlorine Cost Ref H-3 for Disinfection |
|---|---|---|
| 1990 | 7.8 | 13,640 |

APPENDIX XVI - Continued

OPERATION AND MAINTENANCE COSTS
SPOKANE VALLEY SUBSYSTEM
UPGRADE TO INFILTRATION-PERCOLATION
WASTEWATER TREATMENT AND LAND DISPOSAL

Solids Processing Component

| Element | Size or Capacity | Annual O&M Cost | Ref |
|---|---|---|---|
| Flotation | 696 SF | 8,800 | I-1 |
| Anaerobic Digestion | 283,000 CF | 81,000 | I-2 |
| Elutriation | 3400 SF | 10,200 | I-1 |
| Vacuum Filtration | 1378 tons/yr | See Table Below | I-3 |
| Truckhaul | 210 cy/day | See Table Below | I-5 |
| Sanitary Landfill | 210 cy/day | See Table Below | |

| | | Vacuum Filtration | | Truck Haul & Landfill | |
|---|---|---|---|---|---|
| Year | Aver. Flow Mgd | Dry Solids tons/yr(1) | Annual O&M Cost | Filter Cake cy/day(2) | Annual Cost |
| 1990 | 7.8 | 1378 | 50,000 | 21.0 | 34,500 |

Infiltration Percolation Component

| Year | Net Acreage | Annual Cost - Ref H-8 |
|---|---|---|
| 1990 | 94 | 102,000 |

(1) At 968 pounds per MG.

(2) At 20% solids and density 65 pounds per cf (0.18 tons/cy).

APPENDIX XVI - Continued

OPERATION AND MAINTENANCE COSTS
SPOKANE VALLEY SUBSYSTEM
UPGRADE TO INFILTRATION-PERCOLATION
WASTEWATER TREATMENT AND LAND DISPOSAL

Summary

| Component | Annual Cost |
|---|---|
| Conveyance Force Mains and Sewers | 26,743 |
| Pump Station Facilities | 24,200 |
| Pump Station Electrical | 13,370 |
| Infiltration Ponds | 102,000 |
| Subtotal Ponds and Conveyance | 166,313 |
| | |
| Treatment Plant Elements | |
| Fixed w/o solids processing | 526,200 |
| Chemical (chlorine) | 13,640 |
| Fixed solids processing | 100,000 |
| Vacuum Filtration | 50,000 |
| Truck haul and landfill | 34,500 |
| Subtotal treatment plant | 724,340 |
| | |
| TOTAL - Treatment and Disposal | 890,653 |

APPENDIX XVII

DEVELOPMENT OF INTERNAL SEWERAGE SYSTEMS

## Objective

The objective of this appendix is to summarize the criteria and methodology for layout, staging and quantity and cost estimation of internal sewers required to provide community collection systems in the North Spokane and Spokane Valley service areas. It is not the intent that the estimates prepared herein be at the level of refinement necessary to formation of a Local Improvement District or other implementing agency.

## Criteria

The collection systems are sized for year 2020 forecast service populations. Per capita flows and peak to average ratios are as developed in Section 406.1.

Sewers are sized for capacity at 3 feet per second flowing full except where available slope permits a size reduction. In such cases, a size reduction not to exceed one nominal pipe size is taken. The trunk sewers are not sized based on a detailed profile or consideration of possible interferences.

Sewers, force main and pump station costs are as developed in Section 401.2.

Trunk sewers are defined as those 10 inch size and larger. All other sewers are 8 inch size minimum, so that the remainder of the collection system not shown as trunks is size 8 inch. The quantity of 8 inch

sewer required to complete the collection system is determined on the basis of population served using criteria developed for a sample area checked against literature sources as follows.

Size 8 inch sewer normally represents over 75 percent of the cost of collection systems of the extent in this study. This points out the relative insignificance of refined trunk calculation as compared with determination of the extent of minimum size sewers. Layouts of minimum size sewers in sample areas within SMATS zones 252, 255, 260 and 364, having population densities from 3.2 to 7.2 persons per acre, showed sewer length requirements ranging from 29 feet per capita for the lowest density to 20 feet per capita for the highest density.

Carelli (1971) gives sewer costs in dollars per capita at various population densities. Converted to 1974 price level, these costs are $399 per capita at 4 persons per acre and $300 per capita at 16 persons per acre. For average 1974 unit sewer costs of $20 per foot, this indicates 20 to 15 feet of sewer per capita.

Smith and Eilers (1970) tabulates length of sewer in feet per capita for various sized communities. These range from 18.96 feet per capita for average population 12,920 to 13.91 feet per capita for an average population of 66,114.

The literature sources which reflect historical experience with established community sewer systems give lower values that the specific samples in the Spokane area which developed on the basis of individual on-site disposal and without the impetus to locate for optimum sewer extensions. Considering both sources, the expectation is that lower

densities in the Spokane area will require 20 or more feet per capita and the higher densities require 15 to 20 feet per capita. For the North Spokane area which typically has higher densities, 17.5 feet per capita is selected. For the Spokane Valley with typically lower densities, 22 feet per capita is selected.

In general, trunk sewers follow important paved streets with significant traffic and are expected to have construction costs typical of sewers in developed areas. Sewers in 8 inch size are in less important streets and, particularly in the Spokane Valley, having a large proportion that are unpaved. It is necessary to make a judgmental evaluation of expected construction conditions for 8 inch sewers. The selected basis for pricing of 8 inch sewers in North Spokane for the initial phase is on the basis of 80 percent developed and 20 percent undeveloped and for those to serve future development at 90 percent undeveloped and 10 percent developed. The selected basis for pricing of 8 inch sewer in Spokane Valley for the initial phase is on the basis of 65 percent developed and 35 percent undeveloped and for those to serve future development at 90 percent undeveloped and 10 percent developed.

North Spokane

A plan of the North Spokane service area and the developed trunk sewer layout are shown in Figure A. The configuration of the natural topography and the location of the existing housing development both dictate a point of concentration in the vicinity of the Spokane Country Club Golf Course. The conveyance to City STP on the other hand

dictates minimizing pump lift for as large a proportion of flow as possible. This results in moving the point of concentration uphill from the natural low point.

Stage construction is proposed to give priority to areas with either a large existing population or a forecast rapid growth. In 1980 it is proposed to construct trunks and collection sewers to serve all of the heavily populated areas of planning unit NS-3 and the southwest corner of NS-6. The 1980 service population for NS-3 is forecast at 14,409 and a growth to 25,120 is forecast by 2020. That part of NS-3 that is in the City (subarea NS-3A) is sewered and served by the interim Lidgerwood lagoon, which serves approximately 1500 persons now estimated to reach 1700 by 1980. The Fairwood area in the northern part of NS-3, is also sewered to an interim lagoon facility, presently serving about 3000 persons estimated to reach 3500 by 1980. Panorama Terrace, a small City owned interim facility serving 18 persons is also in the initial service area. A trunk is extended a short distance into area NS-2 along Five Mile Road to pick up existing development to Toni Rae Drive. The Camelot-Carriage Hills development which is served by an interim facility is not picked up in the first stage because it is small and remote.

The second stage of trunk development scheduled for 1985 will pick up Camelot-Carriage Hills as part of an extension in anticipation of increasing development in the northern part of NS-6. This extension calls for the construction of a pump station in the vicinity of Dartford Drive and Highway 395. There are approximately 500 persons at present in the nearby Pine River development which would form an important part

of the initial flow from this area. The effluent from the pump station at Dartford Drive and Hwy 395 is relayed by a second pump station in the vicinity of Hastings Road and Hwy 395 which also serves as the receiver for Camelot-Carriage Hills and future flows from the Mead area.

The third stage of service extension scheduled for 1990 consists of 4 elements: (1) The area west of Five Mile Prairie along Nine Mile Road, (2) Five Mile Prairie, (3) Mead and (4) Morgan Acres.

The development along Nine Mile Road is delayed to 1990 because it is remote from the remainder of the service area and its largest existing element, Northwest Terrace, is served by an interim plant. Also in this same area are the newer areas of Sundance Hills and Pacific Park which also have interim facilities. The conveyance facilities to serve this area consist of two pump stations and a force main. The two pump stations are at Lowell Avenue and at Northwest Terrace and dictate the internal collection system for the area.

Five Mile Prairie is not sewered earlier because the forecast population is low and sparse until at least 1990. The forecast population in 1980 is 896 and in 1985 is 1,666. From 1990 on the population is forecast to increase from 2474 fairly rapidly to over 7000 by 2020. Two trunks are proposed to extend into Five Mile Prairie, one from the north and one from the south.

The trunk to serve Mead would extend east from the previously constructed pump station at Hawthorne Road and Hwy 395. The Mead area and the remainder of area NS-9, sewered in 1990, has a population of approximately 2000 but forecast growth is relatively small, increasing

to 2900 by year 2000. An incentive for possibly earlier inclusion of the Mead area is the potential for picking up the sanitary component of the Kaiser Mead industrial waste discharge. This sanitary component of industrial flow is equal to or greater than the flow of feasibly sewered individual dwellings in Mead area and is the only sanitary surface discharge in the lower Little Spokane.

The final element of 1990 stage construction to serve area NS-4 requires a pump station in the vicinity of Regal Street and Market Street. Service area NS-4 includes Morgan Acres north of the City and the Hillyard area inside the northeast corner of the City. These areas are not scheduled earlier because they are forecast to have almost no growth. Low density of development and remoteness from the remainder of the North Spokane service area are also reasons for postponed collection. The low density indicates that it may be feasible to pick up about fifty percent of the population in the collection system. Only Morgan Acres is included in the collection system. The areas east of Market Street both inside and outside the City are too sparsely populated to be feasibly collected. If growth greater than forecast should occur, this area should be reconsidered for collection.

No collection system is proposed in areas NS-7 and NS-8 and that part of NS-9 north of Peone Creek.

Spokane Valley

A plan of the Spokane Valley service area and developed trunk sewer layout are shown in Figure B. The natural point of construction

for the Valley exclusive of the portion west of Edgerton Road is the east end of Felts Field. The system of low ridges and swales that parallel the river establish the pattern of the collection system south of the river. The collection pattern north of the river is set by the existing communities of Pasadena Park and Trentwood. The major portion of the service area is south of the river and the collection pattern results in major trunks in or parallel to main east-west streets, Mission Sprague and 25th-32nd Streets. The area west of Edgerton requires a pump station to bring flows from their natural point of concentration at the east City limits back to the east end of Felts Field.

The forecast growth in the Spokane Valley is less than North Spokane and involves more filling in of already developed areas than of development in entirely new areas. Thus there is a much less distinct pattern of need or opportunity for stage construction from a functional standpoint. The determining factor in staging could well be the need to limit the amount of construction and disruption of the community at any one time. This later concern is considered to be a detail of implementation to be worked out by the community. For the purpose of this study, the staging is based on functional need.

Considering the trunk system, the 1985 construction would include all except the following:

1. The Trentwood trunk east of the river.
2. All of the Montgomery-Jackson trunk.
3. The Sprague trunk east of Sullivan Road.
4. The 32nd Avenue trunk east of Blake.

Considering the 8 inch collection sewers the 1980 construction

would include the feasibly served proportion of the population in areas SV-1, SV-2, SV-3, and SV-4 as shown in Table 2 of Section 406.2. The 1985 trunk and collection construction leaves all of areas SV-5, SV-6 and SV-10 and the eastern half of SV-2 without service.

In 1990 the Trentwood trunk would be extended east of the river and the feasibly sewered population of SV-10 incorporated in the collection system. Also in 1985, the Montgomery-Jackson trunk would be built to serve the east portion of SV-2.

The forecast growth and density in SV-5 remain low but a consideration for extending the Sprague trunk at an earlier date would be to provide a point of connection for the community surrounding Liberty Lake. By 1990, the forecast population at Liberty Lake is expected to be equal to that in SV-5 and would already be served by an internal collection system and separate treatment plant. The extension of the Sprague trunk to Barker Road is scheduled in 1995. Provision of 15 inch size rather than 12 inch size in the last half mile would make the entire trunk suitable for accommodation of Liberty Lake flows if connected. The relatively static population in SV-6 north of SV-5 would be picked up in 2000 following the extension of the Sprague trunk.

Area SV-4 is expected to receive the largest growth both in absolute numbers and rate. Since the central part of SV-4 is already densely developed, the future growth will presumably be by some fill-in to the northern part but mostly by spreading into the undeveloped areas on the south and east. Since this pattern cannot be foreseen, the remainder of the 32nd Avenue trunk is assumed to be constructed in 1995

and 8 inch collection sewers as required to serve forecast growth in SV-4.

No extension of trunks is proposed into area SV-9 beyond the existing area of residential development. The remainder is forecast to remain essentially industrial with relatively small population growth. Also, no extension into SV-8 is scheduled although the population is forecast to increase from 2500 in 1980 to over 5,000 by year 2020. The population increase is expected to be in the most remote part of SV-8 around Newman Lake, with the Valley area to remain at low density.

# SECTION 801.5

## INSTITUTIONAL AND FINANCIAL CONSIDERATIONS FOR FLOOD CONTROL AND URBAN RUNOFF

# WATER RESOURCES STUDY

# METROPOLITAN SPOKANE REGION

## SECTION 801.5

# INSTITUTIONAL AND FINANCIAL

# CONSIDERATIONS FOR

# FLOOD CONTROL AND URBAN RUNOFF

13 October 1975

Department of the Army, Seattle District
Corps of Engineers
Kennedy-Tudor Consulting Engineers

INDEX
SECTION 801.5

SECTION 801.5

# INSTITUTIONAL AND FINANCIAL CONSIDERATIONS FOR FLOOD CONTROL AND URBAN RUNOFF

## Introduction

It is the purpose of this section to present an overview of the institutional and financing capabilities for flood control and drainage through statutory means. The materials in this section are abridged from a Corps of Engineers study* whose major emphasis was flood control and drainage in another metropolitan area of Washington State. The emphasis in the referenced study is toward development of basin wide management and planning capability. There is not a corresponding need in the Spokane study area. The primary problems in the Spokane study area are for control of land use to prevent future or added flood and drainage problems and to plan and implement projects that involve limited areas. The abridgement is intended to recognize this difference in need.

To focus on the specific considerations of the Spokane study area, the needs are briefly summarized.

## Planning Needs

The planning needs of the Spokane urban planning area are in two categories, those to meet flood problems which originate from flows generated

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*U.S. Army, Corps of Engineers, Seattle District. Environmental Management for the Metropolitan Area, Cedar-Green River Basins, Washington, December 1974, Part II, Urban Drainage.

remotely and those to meet urban drainage problems which arise from local runoff.

The planning needs for flood control in turn are categorized as follows:

1. Due to Spokane River: Make planning decisions for the identified isolated locations where problems occur so that the appropriate type of abatement may be selected from available alternatives (including no-action), sponsoring the necessary land use planning action and selecting the necessary means for implementation of structural response where required.

2. Due to Little Spokane River: Provide the guidance for land use planning required to recognize the identified overbank areas.

3. Due to Hangman Creek: Bring the identified locations threatened by inundation or erosion to the attention of land use planning jurisdictions.

The planning needs for urban drainage concerns include the following:

1. For the North Spokane Area: Development of an overall plan for surface drainage, development of standards for drainage to be provided by land developers and selection of the appropriate means for implementing area drainage improvements.

2. For the Spokane Valley Area: Development of policy and planning methods to protect existing infiltration areas and plan methods to deal with additional runoff.

3. For the City of Spokane: Develop solutions to the combined sewer overflow and backup problems.

## Legislative History

The following brief chronology follows the development of drainage legislation since statehood.

1895- The State Legislature enacted a statute providing for the creation

of Diking Districts and a separate statute for the creation of Drainage Districts. Both districts were to be agencies of the respective counties in which they were situated.

1909 - The State Legislature authorized counties to create a "river improvement fund." Monies for this fund were to be raised by levies and general taxes and the funds were to be used to control and repair river-bank erosion. Eminent domain powers were granted to the countries for this expressed purpose.

1913 - The Legislature modified the 1895 enactment to provide for the creation of Diking, Drainage and Sewerage Improvement Districts with somewhat more flexible powers than the predecessor districts. Also, cities and towns were authorized to exercise powers under this statute.

The 1909 statutes that created a river improvement fund, were modified to provide for joint effort on the part of one or more counties to accomplish the same purposes.

1921 - Diking District statutes were amended to remove restrictions upon the number of inhabitants required within an area in which a district was to be formed.

1923 - The State Legislature authorized counties to "regulate and control the flow of both navigable and non-navigable waters within such county or counties for the purpose of preventing floods which may threaten or cause damage public or private."

1935 - The state itself was authorized to form Flood-Control Zones for the purposes of providing flood-control works and planning. Diking and Drainage District statutes were modified to permit financing by the issuance of bonds repayable from assessments levied upon the properties benefited by improvements.

Flood-Control Districts were authorized. The act expressly permitted Flood-Control Districts to contract with other districts and it required a comprehensive plan to be approved by the state. This statute was repealed in 1965.

1937 - A second Flood-Control District Act was passed apparently in an effort to clarify the powers granted in the 1935 statute.

1957 - The Metropolitan Service District Act was passed that permitted the creation of the Municipality of Metropolitan Seattle (Metro).

1961 - Counties were authorized to form Flood-Control Zone Districts (FCZD) with all of the powers necessary for the control and repair of erosion, and for flood control as encompassed in the previous drainage, diking and flood-control districts.

1963 - The State Legislature reconfirmed the 1923 enactments.

1965 - The Legislature removed the requirement that cities could create only storm-water utilities in combination with a sanitary-sewerage disposal and treatment system. This permitted cities to create and operate separate drainage utilities.

1967 - The Legislature passed what has become known as the County Services Act (RCW 36.94) that permits counties to provide the same utility functions as municipalities. This included drainage utility functions.

The same legislature modified RCW 35.67 to permit the issuance of revenue bonds for providing drainage facilities repayable from service charges. This is a key piece of legislation which authorized the service-charge method of funding that makes drainage utilities workable.

The Legislature passed the Inter-Local Cooperation Act (RCW 39.34) that authorized certain municipal corporations to contract together to exercise powers in common. Not all municipal corporations were included, but the effect of this statute has been to make possible a substantial number of combinations of joint effort not previously possible. It is this specific enactment that should make possible drainage management on a sub-basin basis.

1969 - The State Legislature re-enacted and modified the 1923 and 1935 statutes and provided a grandfather clause for all recorded plats within State Flood-Control Zones as of August 15, 1966.

Capabilities of Federal Agencies

Four federal agencies have potential capabilities in the field of drainage and flood control. These are the U.S. Army Corps of Engineers, the U.S. Department of Agriculture, Soil Conservation Service, the Environmental Protection Agency, and the Department of Housing and Urban Development.

Federal agencies do not have the legal authority to provide for local drainage management on a sub-basin basis. Their principal role is to assist in coordinated planning and funding of major works of improvement where necessary, and to provide technical assistance to local agencies in their planning efforts.

The U.S. Army Corps of Engineers has traditionally been responsible, under the 1936 Flood-Control Act, for flood-control planning and construction of major river systems. The primary limitation on Corps participation in Spokane area problems is the constraint that limits the activity to protection where public facilities are involved or the immediate threat to life.

The Soil Conservation Service works primarily with local Soil and Water Conservation Districts and in turn, on the basis of the priorities for assistance established by those Districts, to provide technical and other assistance to local land owners and occupants, and to other local agencies.

In the Spokane area, the SCS would find its primary applicability in promoting non-structural measures in the Hangman Creek watershed to reduce erosion and siltation.

The Environmental Protection Agency (EPA) is responsible for enforcing the Federal Water Pollution Control Act and the 1972 Amendments (Public Law 92-500) which, in addition to covering point sources of pollution such as sanitary-sewage outfalls and industrial outfalls, covers non-point sources of pollution such as are associated with storm runoff.

Since guidelines have not been set for urban runoff to date, it is not expected that EPA would be particularly active at this time except as related to combined sewer problems. For the Spokane area, the primary early involvement of EPA in urban runoff is expected to be in relation to the City combined sewer overflow problem, possibly to the extent of grant aid.

The National Flood Insurance Act makes flood insurance available to property owners living on flood-prone lands in communities that demonstrate a commitment to flood-control programs. This insurance program is administered by the Department of Housing and Urban Development. In order for property owners to qualify, their local government must define the flood plain, list specific flood plain land-use control measures, and inventory land uses within this area.

The possible benefits to specific Spokane area problems are cited in Section 604.6.

Capabilities of State Agencies

The State of Washington as indicated in the review of legislation, has had a continuing role in the development of necessary state and local authorities for the proper management of drainage and its related resource management problems. In addition, certain state agencies have actual planning and operational responsibilities and powers related to drainage.

Traditionally, the state's role has been one of regulation rather than operation, and as such, it is unlikely that a state agency will function as a drainage-management agency for any subarea in the Spokane study area.

The principal state agency involved with drainage is the Department of Ecology which is responsible for work done by the state under Flood-Control Zone legislation. There are no existing designated Flood-Control zones in the Spokane study area. The powers of a Flood-Control Zone includes "supervision and control over all dams and obstructions in streams," and the power to "make reasonable regulations with respect thereto concerning the flow of water (deemed) necessary for such works from flood waters." (RCW 86.16.035.)

A Flood-Control Zone may be formed by order of state supervisor of flood control (RCW 86.16.060). The applicability of a Flood-Control Zone to Spokane urban area problems appears unlikely.

The Shoreline Management Act, as administered by the Department of Ecology, designates land-use control zones of 200 feet adjacent to marine waters, lakes of 20 acres or more in size, and streams with a mean annual flow of greater than 20 cubic feet per second. This also includes associated marshes, bogs, and swamps. Local jurisdictions are responsible for determining acceptable uses within these shoreline areas and therefore have the ability to preserve the bog-type lands and prevent intense development from encroaching upon stream courses.

Location of storm-drain outfalls and other utility structures also may be covered (at local option) by this Act. The provisions of this act are particularly applicable to the control of overbank areas on the lower reaches of the Little Spokane River.

County Capabilities

As of 1967, county governments have had all of the necessary powers that appear to be required to effect rational drainage management. These include powers under the County Services Act (RCW 36.94) which would permit the furnishing of utility service on a sub-basin basis and the Flood-Control Zone District Act (RCW 86.15) that could accomplish the same ends.

Under both of these acts, a county is empowered to consider drainage on a drainage-basin basis and to finance necessary drainage improvements through the use of revenue bonds financed by service charges. Another important power, and responsibility, is the operation and maintenance of rivers and drainage systems.

A county is responsible for specific drainage and flood-control activities and, in addition, is the agency responsible for the general transportation network and land-use planning and regulations in unincorporated areas. It is these broad powers that make it clear that counties are one of the logical agencies to provide drainage management and control for specific sub-basins. The counties traditionally have had staffs concerned with drainage and flood control.

The counties are somewhat restricted in planning for drainage that passes through municipalities because the latter have such powers. Therefore it would appear necessary at this time for inter-governmental agreements to be entered into, under the authority of the 1967 Act of the Legislature, on a sub-basins basis for the counties to function effectively, unless the Legislature were to change the allocation of powers among those two units of government. The joint agreement arrangement seems the more practical alternative at this time. This provision may have utility in dealing with drainage problems in North Spokane where City and County jurisdictions cross drainage boundaries.

A provision that may be useful in encouraging non-structural methodology is to be found in the Current Use Taxation Act. This act provides that residents owning property located in designated open-space areas, within any county, may apply for tax relief. If granted, property taxes are based on current use rather than potential use. Open space is defined as any area so designated on a Comprehensive Plan, or lands "the preservation of which in its present use would:

1. Conserve and enhance natural or scenic resources, or
2. Protect streams or water supply, or
3. Promote conservation of soils, wetlands, beaches or tidal marshes."

Capabilities of Cities

Cities appear to have all the necessary utility powers to form

drainage utilities and manage finance, construct and operate drainage facilities. Where city boundaries do not encompass the entire drainage area desirably managed as a unit, there are provisions to accomplish the necessary coordination through inter-governmental cooperation agreements as discussed above for counties.

Provisions under a Metropolitan Municipal Corporation

There is no existing Metro in the Spokane study area. The formations problems are discussed under institutional arrangements for wastewater management. It appears unlikely that a Metro would be adopted in response to the wastewater management requirements. A Metro, if one existed or should be formed, could perform certain drainage functions. The drainage problems of the Spokane area are not of such character that a Metro type solution would be sought. Furthermore, the disadvantage cited for Seattle Metro in this respect as follows indicate against its use:

No satisfactory means to finance storm-drainage systems or require hook-ups in the manner of sewage interception and treatment from component agencies has been available, so the authority has not been exercised. The authority of Metro in storm drainage does not include non-structural solutions, such as land-use zoning, development building, and construction-permit locations.

Capabilities of Special Districts

General. The following special districts can perform various drainage

functions:

1. Sewer Districts
2. Diking Districts
3. Drainage Districts
4. Diking, Drainage and Sewerage Improvement Districts
5. Soil and Water Conservation Districts
6. Flood Control Districts
7. Flood Control Zone Districts
8. Local Improvement and Utility Local Improvement Districts

With the powers presently residing in counties and municipalities it appears highly unlikely that these special districts could provide added benefits that would make their use attractive for broad planning. Special-district procedural requirements and financing limitations make it highly unlikely that they would be able to serve in the role as drainage managers.

These special districts are administered by the county in which they are located as are present Flood-Control Zone Districts. Counties can form a single FCZD that includes the entire county and then create sub-areas for purposes of carrying out improvement programs.

The more important characteristics of these special districts are described below. Except for FCZD, no special district has land zoning and use control powers. For FCZD the powers are the same as for the county. All except Soil and Water Conservation Districts have the right of eminent domain.

Sewer Districts. May be inter-county (RCW 56.04.020) but cannot, without consent of city, include city (RCW 56.04.020). There must be adopted a general comprehensive plan before ordering any improvements or submitting to a vote any proposition for incurring any indebtedness (RCW 56.08.020).

Sewer districts have authority to regulate the use and operation of sewer system, including public highway, street and road drainage, and may require connection by property owners to the drain system (RCW 56.08.010), but lacks police power to regulate land development, require water retention, require plat restriction, or conditions relating to storm or surface water control.

Diking Districts. Can be used by cities as well as counties (RCW 85.05.260). Diking districts have no continuing planning powers and have no regulatory powers. Capabilities are primarily in ability to purchase rights-of-way and construct and maintain improvements.

Drainage Districts. Drainage districts can also be exercised by cities as well as by counties (RCW 85.06.230). Drainage districts have no continuing planning powers and no regulatory powers. Capability is primarily in construction and maintenance of facilities. Unique powers include that the district may contract with a county for the establishment, maintenance and operation of a storm and surface water drainage system (RCW 36.94.190) and may contract with real property owners within

district or up to 10 miles outside for drainage services (RCW 35.91.020).

Diking, Drainage and Sewerage Improvement Districts. Diking, Drainage and Sewerage Improvement Districts are exercisable by counties or cities, but exercise by cities is subject to approval of State Board of Health (RCW 85.08.010).

These districts have no continuing planning powers and regulatory powers limited to provision for the district board supervisors to, by reasonable rules, determine the conditions whereby any landowner in the district may connect for drainage purposes (RCW 85.08.680).

Again, primary function is construction and maintenance of drainage facilities.

Soil and Water Conservation Districts. May "develop detailed comprehensive plans for the conservation of water and soil resources and prevention and control of soil erosion..." [RCW 89.08.220(7)].

These districts have no regulatory powers. Capabilities are limited primarily to operations to assist in erosion control and prevention as, for example, it may cooperate or enter into agreements with any agency or landowner or tenant and furnish financial or other aid in carrying on erosion control and preventative operations within the district.

Flood Control Districts. May investigate and plan construction, improvement, replacement, repair or acquisition of dams, dikes, levees, ditches, channels, canals, banks, revetments and other works, appliances,

machinery and equipment and property and rights connected therewith or incidental thereto, convenient and necessary to control floods and lessen their danger and damages and may cooperate with any agency of the United States and/or of the State of Washington in investigating and controlling floods and in lessening flood danger and damages (RCW 86.09.010).

Flood control districts may operate in more than one county but have no regulatory powers. In addition to the above cited planning power, flood control districts may also purchase land and construct and maintain flood control facilities.

Flood Control Zone Districts. May plan all necessary improvements and works to control, conserve and remove flood waters; and cooperate with or join with the State of Washington, United States, another state, any agency, corporation or political subdivision of the United States or any state, Canada, or any private corporation or individual for the purposes of the district (RCW 86.15.080).

In addition to the foregoing planning capabilities, FCZD has limited regulatory powers as indicated by its ability to "take action necessary to protect life and property within the district from flood water damage (and) control, conserve, retain, reclaim and remove flood waters and dispose of the same.." (RCW 86.15.080) which action beyond construction and maintenance, includes only the power to "order, on behalf of the county, that an action be brought in the superior court of the county to require the removal of publicly or privately owned structures,

improvements, facilities, or accumulations of debris or materials which materially contribute to the dangers of loss of life or property from flood waters (RCW 86.15.190).

Considering its ability to exercise land zoning and use powers as well as planning and the usual consturction and maintenance of facilities, FCZD has the broadest capability of the special district.

Local Improvement and Utility Local Improvement Districts. These are special districts that can be formed by any municipal corporation for the purpose of financing and constructing utilities in general, among which can be drainage facilities. These local improvement districts are primarily financing and implementation tools and rely on the parent agency for planning and regulatory functions. LIDs and ULIDs are discussed more fully under financing capability below.

Financing Consideration

General. As discussed for wastewater management plan implementation there are a number of basic methods for providing funds for public services. Funding of drainage and flood control services has some unique considerations that make them particularly difficult. For this reason, these methods are explored again considering the unique problems of drainage and flood control funding.

One of the common methods applicable to other utilities for many years has been the service charge. The Washington Chapter of the American

Public Works Association has been concerned about drainage financing for many years and has worked to modify state law to provide for the financing of drainage facilities by the use of revenue bonds supported by monthly service charges. After several attempts, the municipal utility law was changed in 1967 (RCW-35.67).

The five basic methods commonly used to provide funding of public services are as follows:

1. Regular tax funds
2. General obligation (G.O.) bonds
3. Special improvement district (L.I.D.) assessments
4. Service charges, and
5. Special fees

Each method is discussed below as it specifically applies to the financing of drainage facilities and operations.

Regular Tax Funds. Regular tax funds are those monies levied for the support of the general government of a particular area. This level of funding is usually limited to 20 mills (at 50 percent evaluation) for all purposes and provides the basic administration, police and fire protection services for a particular agency. It is of necessity a very limited source of funding.

One related source of funds is the 1/2-cent gas tax rebated to local agencies by the state in proportion to the amounts of fuel and vehicle

registrations within their particular jurisdiction. The road funds are used primarily to provide arterial street improvements. Often portions of these monies also are used as the only available source for construction of drainage facilities. Drainage facilities constructed with these funds are those facilities necessary to support roadway construction. However, in some instances, other construction has been accomplished. General tax funds are extremely limited and usually are committed to existing urban services. In most cases, they are not available in sufficient quantity to support an extensive capital-improvement program for drainage.

General Obligation Bonds. General obligation bonds are supported by taxes levied against all properties within a particular jurisdiction. The issuance of these bonds must be approved by a 60 percent majority of the voters within the jurisdiction. Since drainage is one of those services that is not an everyday need, it is too often given the lowest priority when presented to the voters at an election.

Further, since those suffering drainage or flood problems represent such a small part of the total electorate, it is almost impossible to get a simple majority vote let alone a 60 percent favorable vote. Consequently, the success of General Obligation funding for drainage improvements has been very limited.

Another factor regarding General Obligation Bonds is the fact that they are not equitable when considering drainage. These bonds are repaid by

taxes on all properties whether or not they are developed. Consequently, forest lands, wetlands, and natural areas, that may actually help to maintain the natural drainage system are charged on the same basis as a fully impervious shopping center or parking area. The amount paid by undeveloped lands, while less than improved property, nevertheless is another factor forcing these lands into development.

Special District Assessments. The municipal corporations (City, Counties, and Districts) of the study area have the power to form special improvement districts known as Local Improvement Districts (LID) or Utility Local Improvement Districts (ULID) for the purpose of providing specific facilities.

The process used, in the case of drainage facilities, provides for distribution of the cost among the properties in the improvement district in proportion to the benefit received by each property.

The resultant assessment amounts to a lien against each property and may be paid as a lump sum or in annual assessments over a period of years but not to exceed 15.

Unless the boundaries of the district can encompass an area with a large percentage receiving significant obvious benefit, the formation of the LID or ULID can be blocked by protest. A protest exceeding 50% by area may block an L.I.D. proceeding in a City. A protest exceeding 40% by area may block a U.L.I.D. proceeding in a County or Special District.

Consequently, the assessment process has not proven successful in developing adequate drainage facilities to solve existing drainage problems, let alone in planning ahead for the future. This form of funding, therefore, is not suitable for funding general drainage. It may possibly find application for small areas with a common problem that is within their funding capability.

Service Charges. Normally recognized utilities operate on the basis of service charges, service charges based upon the amount of a particular service that a property owner utilizes. In the case of a water utility, this is measured by the quantity of water that flows through a meter. In the case of a sanitary-sewer system, the same measurement can be made with suitable deductions, or a flat fee can be determined on the basis of the size of property or number of people, or number of fixtures.

This analogy goes on through power, telephone, and natural gas services. With the modification to the municipal code RCW 35.67, by the 1967 State Legislature, drainage was included in the list of municipal utility services and given all powers related to the other services to levy service charges and to provide for revenue-bond financing.

With this enabling legislation, counties and municipalities may establish a system of service charges for drainage. Service charges may be levied against all property, developed or undeveloped. When more than one jurisdiction is present in a drainage basin, it is necessary to obtain governmental agreements as to how the billing will be handled and income

distributed, before service charges can be collected. With this reservation, service charges can be established to cover three categories of expense: (1) operation and maintenance costs, which can include planning and studies of drainage management, (2) general facility costs which could include the acquisition of wetlands, streamways, or property that have general benefit to a community or jurisdiction, and (3) local-facility costs, or the costs that would normally be included in a Local Improvement District but which now can be paid for on a monthly service-charge basis rather than on the basis of assessment charges.

Special Fees. Several jurisdictions in the State have instituted development fees which are charged to a property owner when he applies for a development permit. These fees are normally for a specific purpose, such as water, sewer, and occasional drainage. The fee is usually charged on an acreage basis and is an attempt to reflect the development's share of some existing or future general facilities that will provide service to the development. This type of charge does not provide a continuing source of funding for other aspects of drainage management. The continued use of such fees could have some merit if combined with utility service charges in the same manner as the so-called "late comer" charges, common with water and sanitary-sewer systems.

Funding Capabilities. Funding capabilities of various agencies are compared in Table 1. In general, the funding capabilities of the cities and counties are superior to special districts. Of particular interest is the fact that only cities, counties and sewer districts can utilize

the service charge method. The FCZD is essentially an extension of county capability. The LID or ULID is the procedural vehicle for approval and assessment financing within a special benefit area, which may be formed by petition of property owners or by resolution of the governing body of the agency of jurisdiction.

Grant Availability. Grant availability for flood control and drainage works is limited. Two possible sources are:

Interagency Committee for Outdoor Recreation - The Washington State Interagency Committee for Outdoor Recreation administers funds for land acquisition made available by the Federal Bureau of Outdoor Recreation and State Referendum 28. These funds can be used for acquisition of greenbelts, native parks and passive areas. Again, the priority of such acquisitions is low, ranking behind active recreation and marine-oriented parks.

Environmental Protection Agency (EPA) - The main emphasis of the EPA's Water Pollution Control grant program has been for projects involving sanitary-sewage treatment. The funds are available, however, for abating and controlling pollution generated by storm runoff. The problem and conflict are that storm-water pollution control projects are rated low on the priority listing of fundable projects by the state clearinghouse (DOE). Additionally, it may be difficult to show that a storm-runoff pollution control project is more beneficial than a sanitary-sewage control project.

## Application to the Spokane Area

The powers described above for the cities and counties indicate that these two existing entities can meet all the necessary requirements for planning and the implementation of non-structural measures for both flood control and urban drainage. One exception is the special capabilities of the Soil Conservation Service and Soil Conservation Districts with respect to non-structural measures for control of erosion.

For the implementation of structural plans for flood control and urban drainage, the city and county again have adequate power either of themselves or through the formation of local improvement districts. There does not appear to be any advantage to the variety of specialized districts of limited applicability and limited methods of funding. There are no specific action plans which are not contingent upon local planning decisions so that specific funding plans cannot be considered. Certain generalizations can be made, however. Whatever plan is evolved in detail for the North Spokane Area or for the City internal drainage problems, the method of revenue bonding supported by service charges appears to offer the best financing. Small improvement projects of local benefit, like Peaceful Valley, point to use of local improvement districts.

TABLE 1

FUNDING CAPABILITY OF
VARIOUS AGENCIES

| Agency Type | Funding Capabilities | | | | |
|---|---|---|---|---|---|
| | General Tax Levy | General Obligation Bonds | Special District Assessments | Service Charges | Revenue Bonds |
| City | Yes | Yes | Yes* | Yes | Yes |
| County | Yes | Yes | Yes** | Yes | Yes |
| Sewer District | Yes | Yes | Yes** | Yes | Yes |
| Diking District | No | No | Yes | No | No |
| Drainage District | No | No | Yes | No | No |
| Diking, Drainage and Sewerage Improvement District | No | No | Yes | No | No |
| Soil and Water Conservation District | No | No | No | No | No |
| Flood Control District | No | Yes | Yes | No | No |
| Flood Control Zone District | Yes | Yes | Yes | Yes | Yes |

*By L.I.D. proceeding.
**By U.L.I.D. proceeding.

TABLE 2

PROCEDURE FOR CREATION OF
A UTILITY LOCAL IMPROVEMENT DISTRICT
FOR DRAINAGE

1. Petition to the County Commissioners by 25 percent of the registered voters requesting formation.

2. Hearing before County Commissioners to establish boundary lines and set date election.

3. Petition, nominating candidates for drainage-district commissioners.

4. Election to form District, elect Commissioners, and vote upon 5-mill levy for preliminary general expenses.

5. Preparation of a Comprehensive Plan by consultants, approved by state regulatory agencies, and adoption by Board of Drainage District Commissioners.

6. Bond authorization, must be approved by a vote of the people.

7. Utility Local Improvement District proposed:

   a. By petition of owners of 51 percent of the real property, or

   b. By Resolution of Intent by Drainage District Commissioners.

8. Preparation of Preliminary Assessment Roll for drainage-system improvements.

9. Public Hearing for formation of the ULID:

   a. To hear protests of formation of the ULID.

   b. To establish final boundaries of ULID.

10. Utility Local Improvement District formed by Resolution.

11. Preparation of design plans and specifications, by Engineer, for drainage-system improvements.

12. Preparation of financial report by fiscal consultants.

13. Prepartion of Final Assessment Roll for drainage-system improvements.

14. Public Assessment Roll Hearing on any objections to assessments.

TABLE 2 - Continued

15. Confirmation of Assessment Roll by Drainage District Commissioners.

16. Solicitation for bids for the construction of drainage-system improvements.

17. Opening for bids for the construction of drainage-system improvements.

18. Sale of bonds.

19. Award of contract for the construction of drainage-system improvements.

20. Construction of drainage-system improvements.

TABLE 3 - Continued

17. Sale of bonds.

18. Solicitation for bids for the construction of drainage-system improvements.

19. Opening of bids for construction of drainage-system improvements.

20. Award of contract for construction of drainage-system improvements.

21. Construction of drainage-system improvements.

In addition to the above described procedure, the requirements for environmental assessments and hearings set forth in the State Environmental Policy Act must be fulfilled.